

BLOHM & VOSS

Bv 138

Heinz J. Nowarra



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Bundesarchiv
Nowarra
Podzun

Translated from the German by Don Cox.
Cover artwork by Steve Ferguson.

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German flying boat base in Norway, spring 1942. On the left is a Dornier Do 24 air-sea rescue plane, to the right a Bv 138 C.

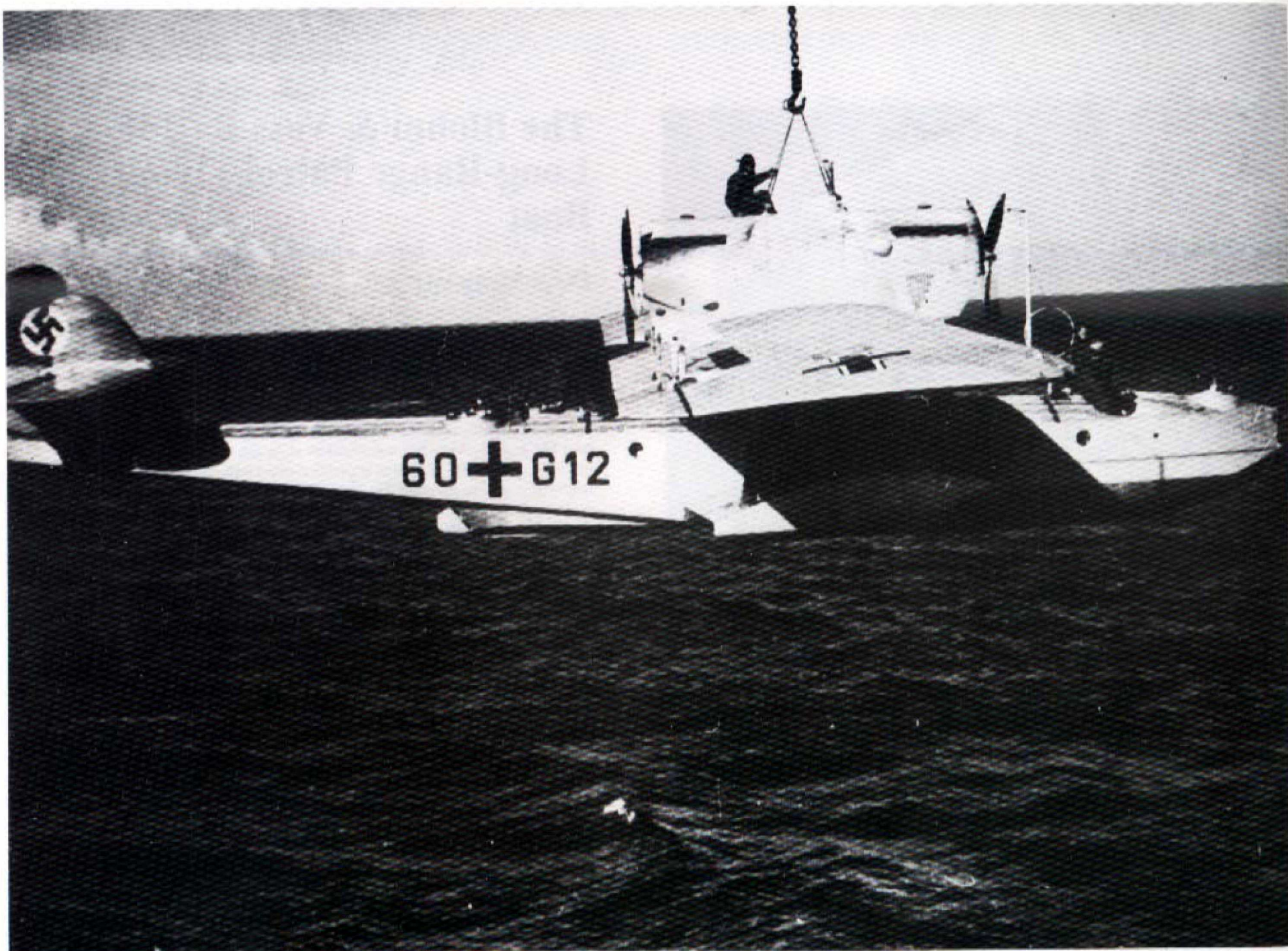
The Blohm & Voss Bv 138 Long-Range Patrol Flying Boat

Development

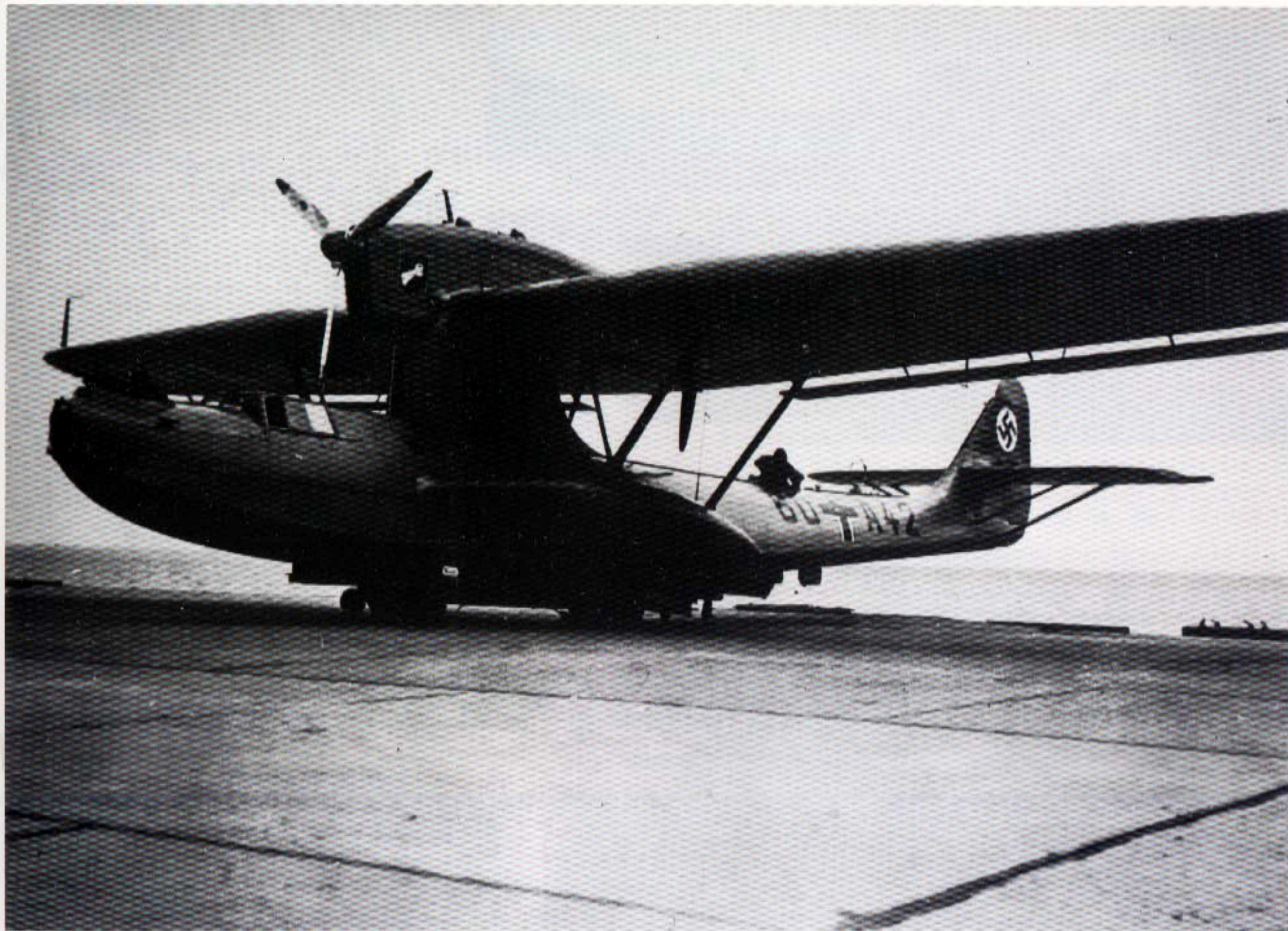
Based on a requirement by the Reichsluftfahrtministerium (RLM), in 1934 Dr. Richard Vogt, chief of development at the Hamburger Flugzeugbau (later Blohm & Voss, Dept. Aircraft Construction), drew up plans for three long-range patrol flying boats. These were to have been fitted with heavy oil diesel engines, since this type of powerplant provided a significant jump in range due to its thrifty fuel consumption rate. The Junkers Jumo 205 was available at the time and although it only had an output of 600 hp, it was hoped that eventually the more powerful BMW 15 could be installed. Dr. Vogt therefore proposed that two of the projects, P.8 and P.8a, be powered by two BMW 15s each, and as an alternative offered the P.12 with three Jumo 205s. As a final measure, he also designed a project for the twin-hulled P.13 with four Jumo 205 engines. The P.13 was rejected by the RLM, however, and this organization called for a new design along the lines of the P.8 project. As it was questionable whether the BMW 15 would ever be made available, Dr. Vogt proposed building the following prototypes: Ha 138 V 1 with two BMW 15s, Ha 138 V 2 with two Daimler-Benz DB 600 (petrol-powered engines). By March of 1935 the mockup of the Ha (later Bv) 138 V 1 was finished, but was now to have been fitted with two Jumo 206s in place of the BMW 15. The RLM gave its approving nod and construction began.



This photo of the Jumo 205 D shows the air intake slits behind the propeller cone, along with the additional intake located above the cowling.



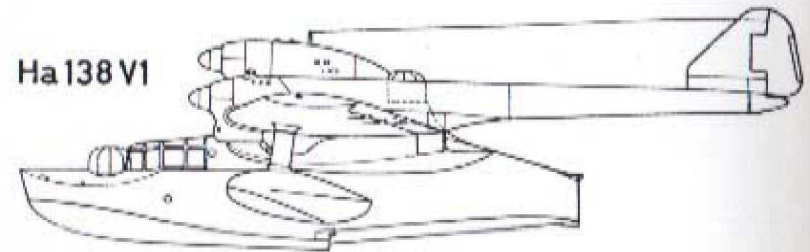
In 1935 the Luftwaffe's sole long-range flying boat was the military variant of the Dornier Do 33 Wal.



The military Do 33 Wal was soon replaced by the Dornier Do 18, which had also been developed from one of Lufthansa's flying mail boats. This is a machine from 2 Staffel of Küstenfliegergruppe 406.



Ha 138 V1



The result was a flying boat with a short central hull, whose gull wings were cranked sharply downward toward the fuselage to which they joined. This arrangement provided a good field of fire to the rear for a turret, provisions for which were also made in the nose. The two engines were attached at the point where the wings "gulled" and tapered back into the control surface booms. Basic construction had been completed by the autumn of 1936, but then came news from Junkers that its Jumo 206 would not be delivered. This forced the designers to install a third engine above the hull, for now it became necessary to use three Jumo 205s. The requisite construction work and conversion effort took up so much time, however, that the Ha 138 V1, D-ARAK, didn't complete its first flight until 15 July 1937.

*Above left:
Blohm & Voss Ha 138 V1, D-ARAK, on its maiden flight.*

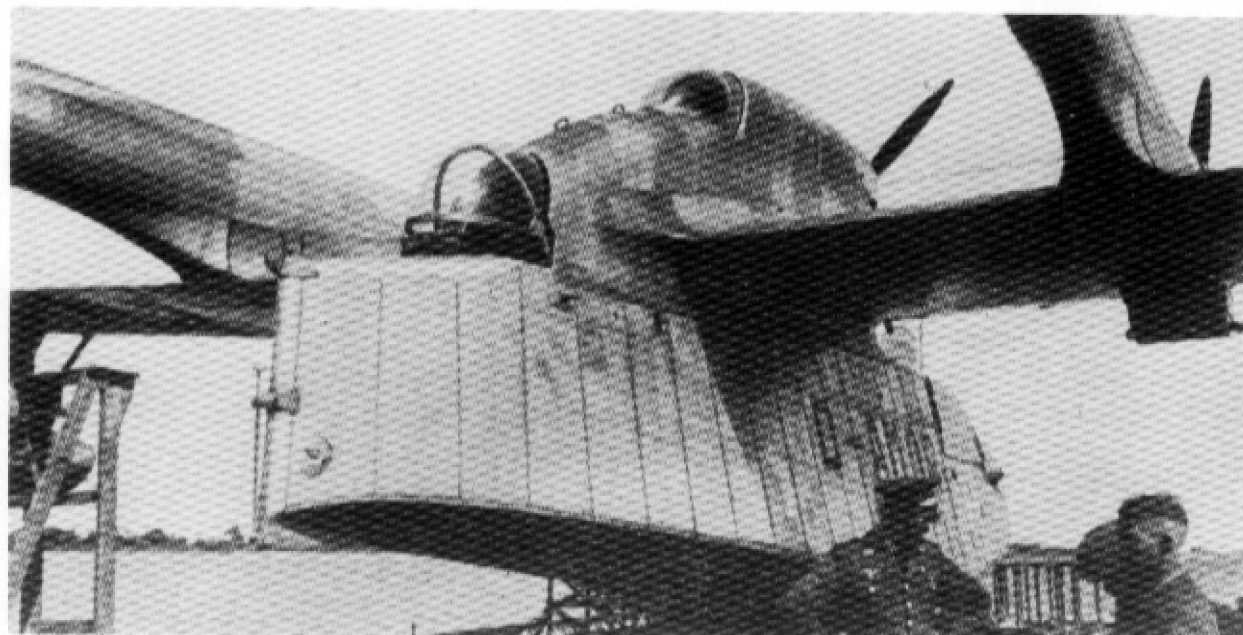
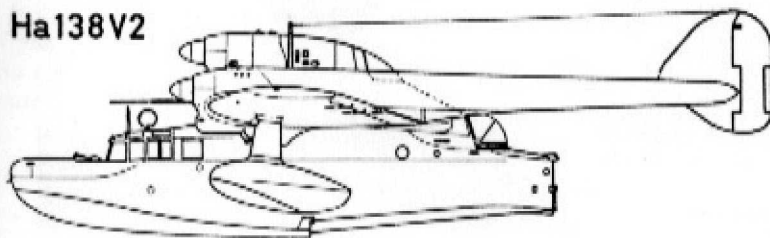


*Left:
This front shot of the Ha 138 V1 clearly shows how the center engine was not part of the original design, not being integral to the basic airframe.*

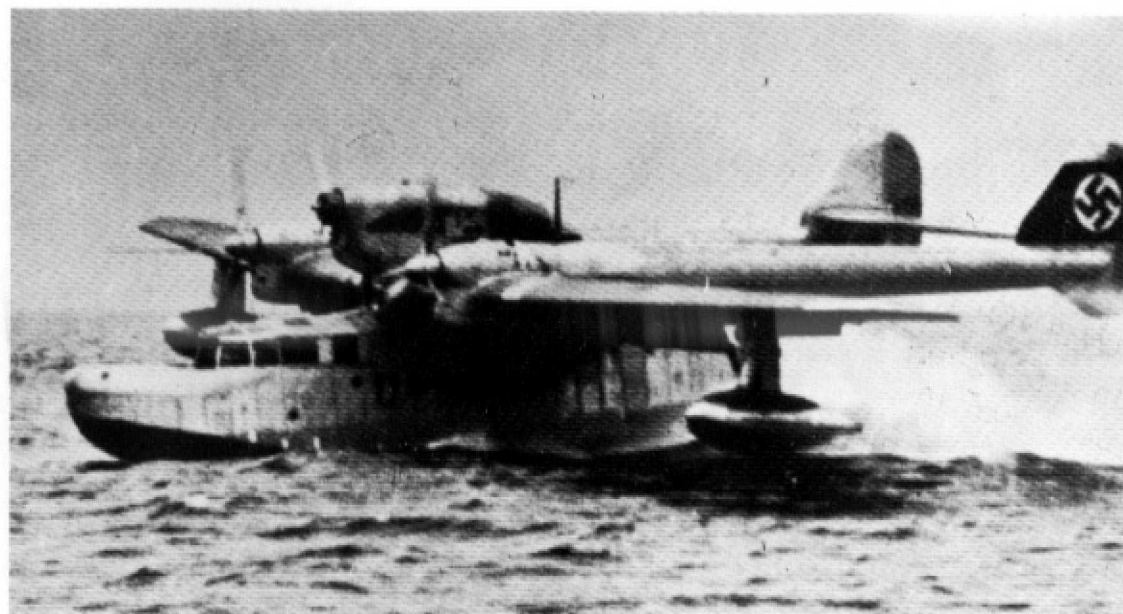
Testing

The Ha 138 V 2, D-AMOR, showed that it too was not the ideal solution. After the flying boat had entered testing in Travemünde on 6 November 1937, it was discovered that the airframe was not suitable for operations on the high seas. Accordingly, construction of the Ha 138 V 3 was dropped in favor of proceeding directly to the first pre-production machine, Bv 138 A-01, D-ADJE, which completed its first flight in February 1938. Although the basic design of the Ha 138 V 2 was retained, D-ADJE was significantly larger and more stable. The hull was lengthened from 12.20 meters to 15.14 and improved hydrodynamically. For armament, the aircraft was fitted with an LB 204 (20 mm) gun turret in the nose. Each of the rear gunner's positions, which remained open, were armed with an MG 15. The aircraft was powered by three Jumo 205 C-4 engines, each having 605 hp takeoff power. Testing of the boat proved to be so satisfactory that an additional five flying boats were contracted for. The fourth prototype became the Bv 138 B-0, BI+AT, which dispensed with the LB 204 turret but had a reinforced airframe. This increased the all-up weight compared to that of the A-01 from 13,750 kg to 15,500 kg (with a maximum permissible weight of 17,400 kg).

Ha138V2

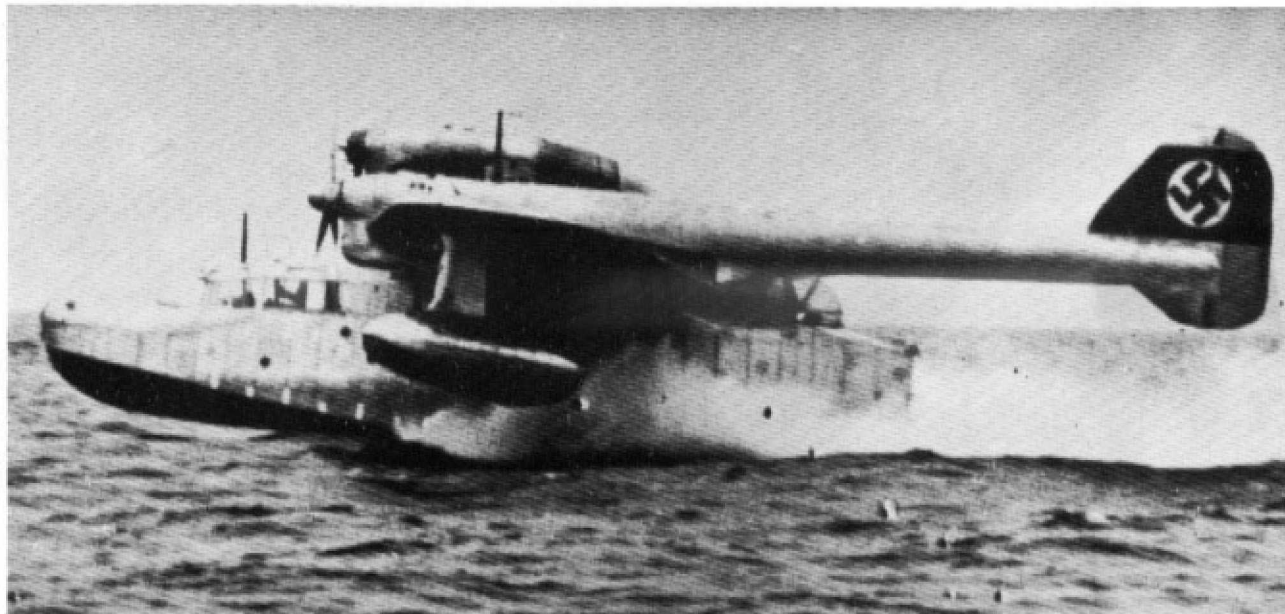


This close-up photo of the Ha 138 V 2 shows the position of the two rear machine gun positions and their large field-of-fire.



Ha 138 V 2, D-AMOR, shortly before taking off.

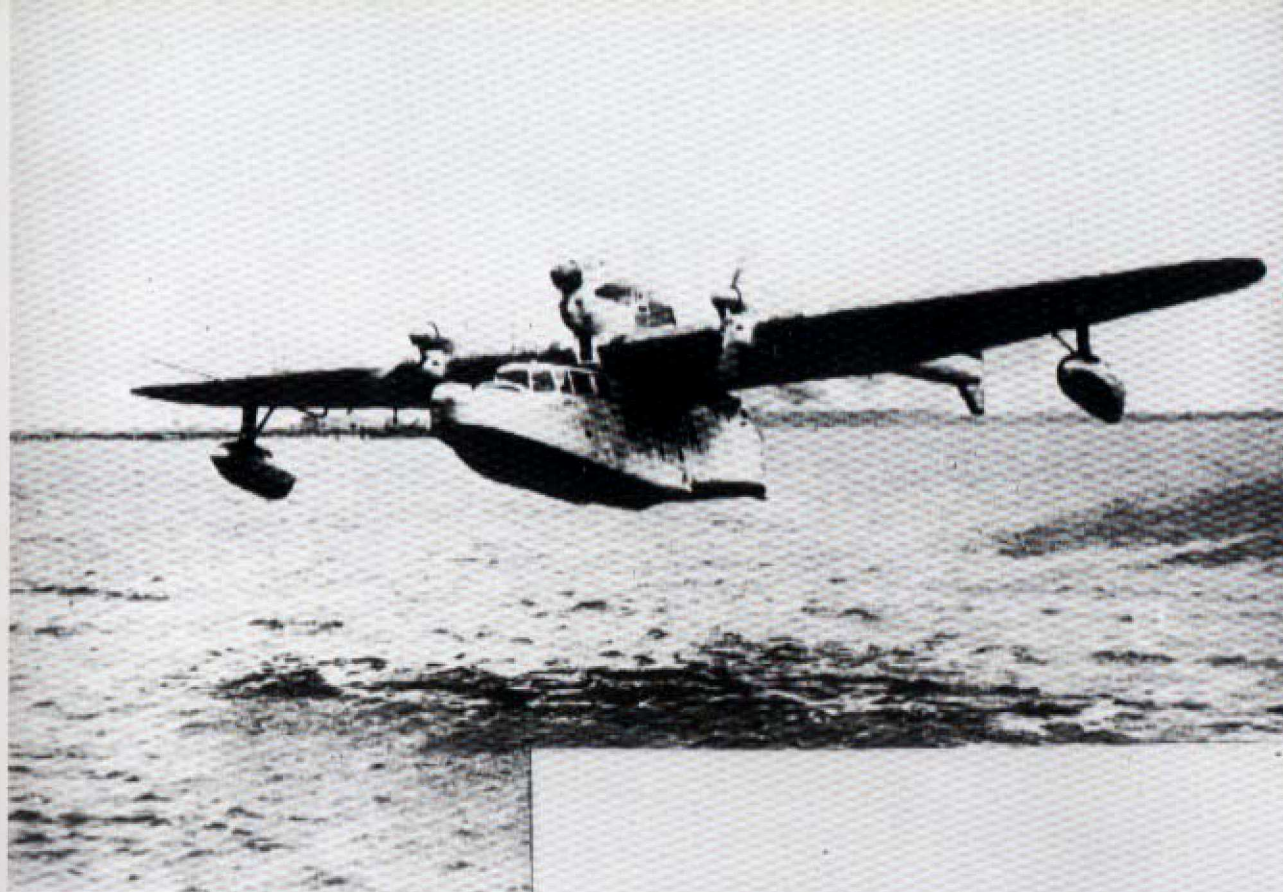
Ha 138 V 2



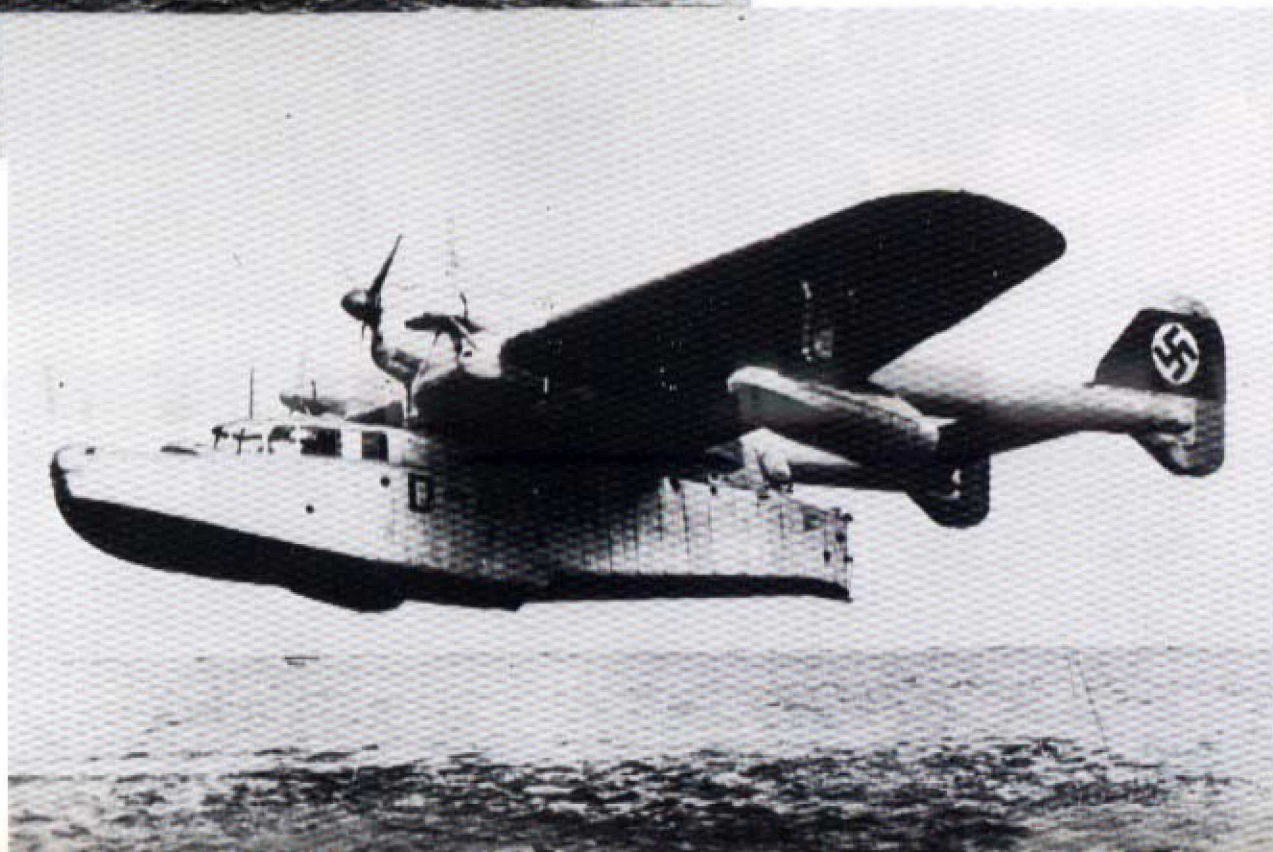
*Left:
Ha 138 V 2 taking off - liftoff speed is
nearly attained.*



*Right:
The boat's nose has
already cleared the water.
In seconds, the rest of the
hull will follow suit.*



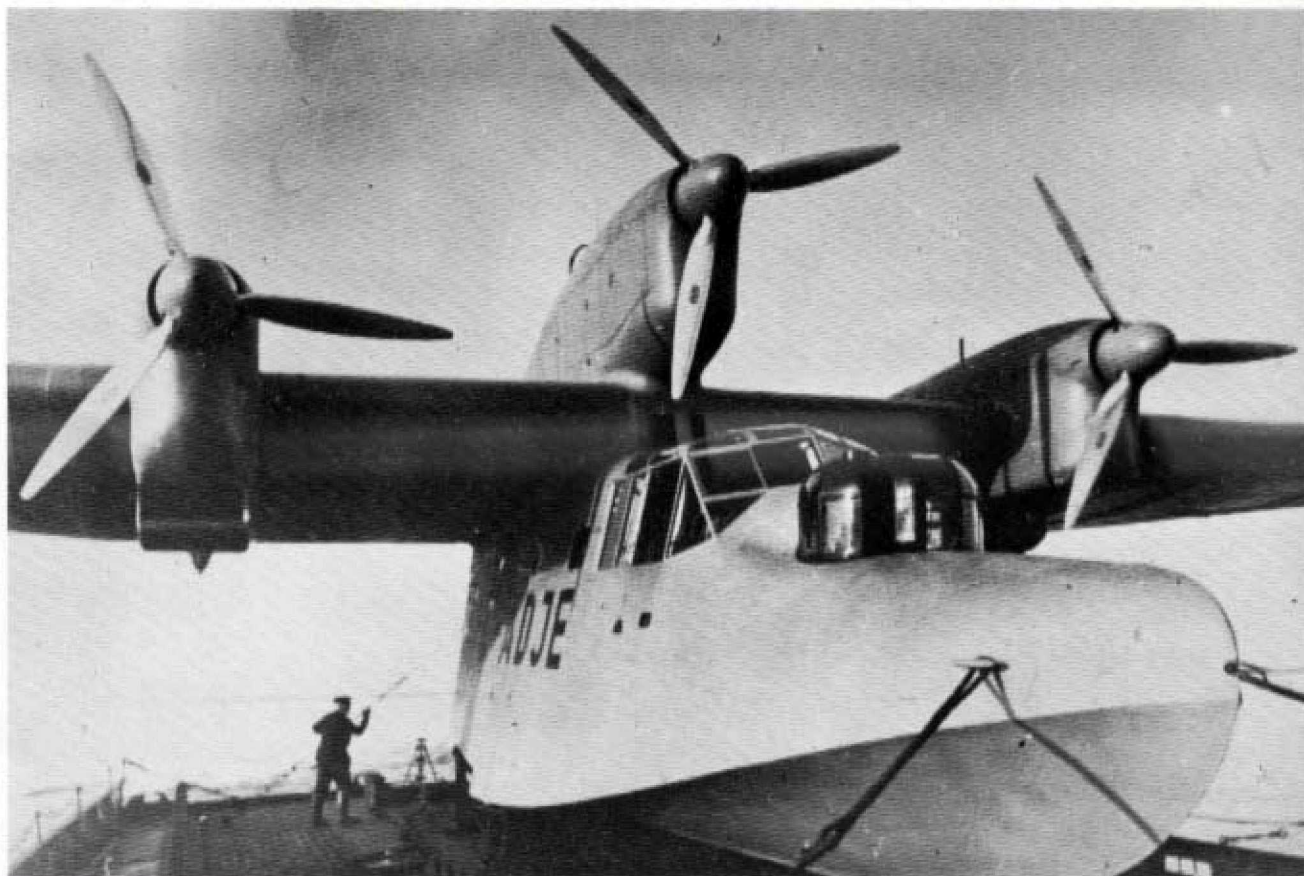
*Left:
The Ha 138 V 2's engines are
running at full throttle, with the
machine already having lifted clear
of the water's surface.*



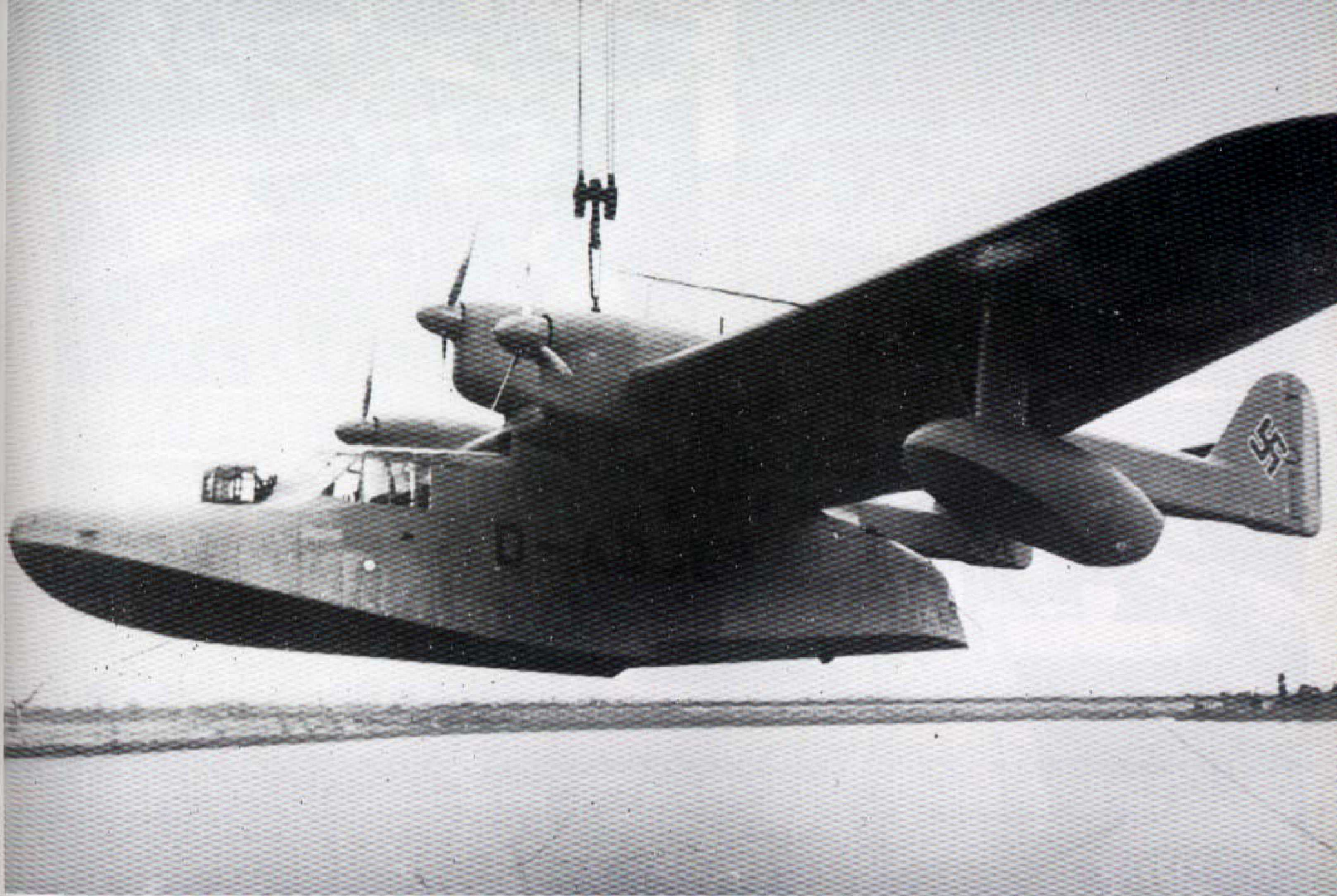
*Right:
Ha 138 V 2 swings out over the
water.*

Bv 138 A-01

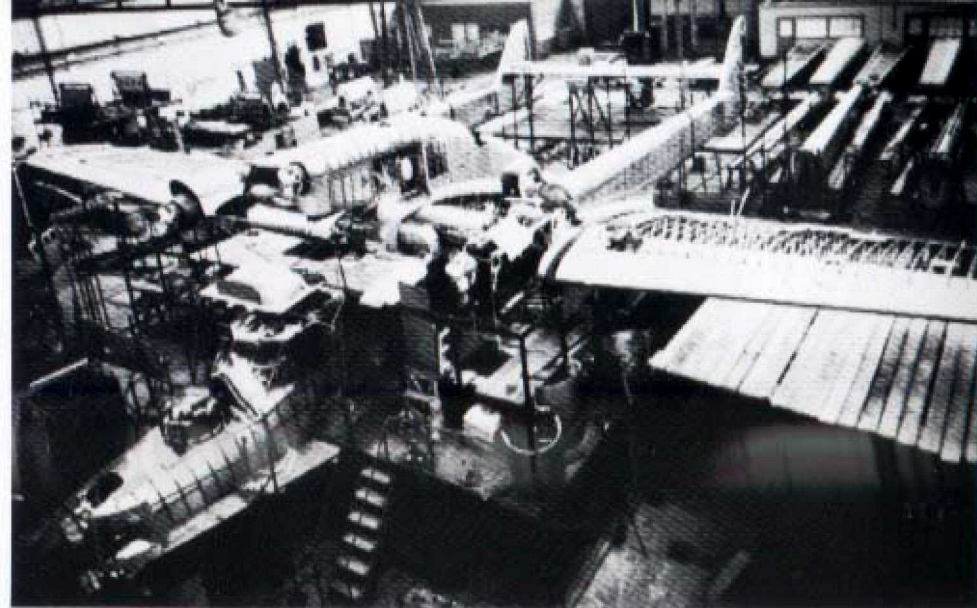
*Right:
Close-up of the Bv 138 A-1, D-ADJE. Note
the LB 204 turret in the nose.*



*Left:
This side photo shows off well the
aerodynamically clean lines of the flying
boat's hull.*

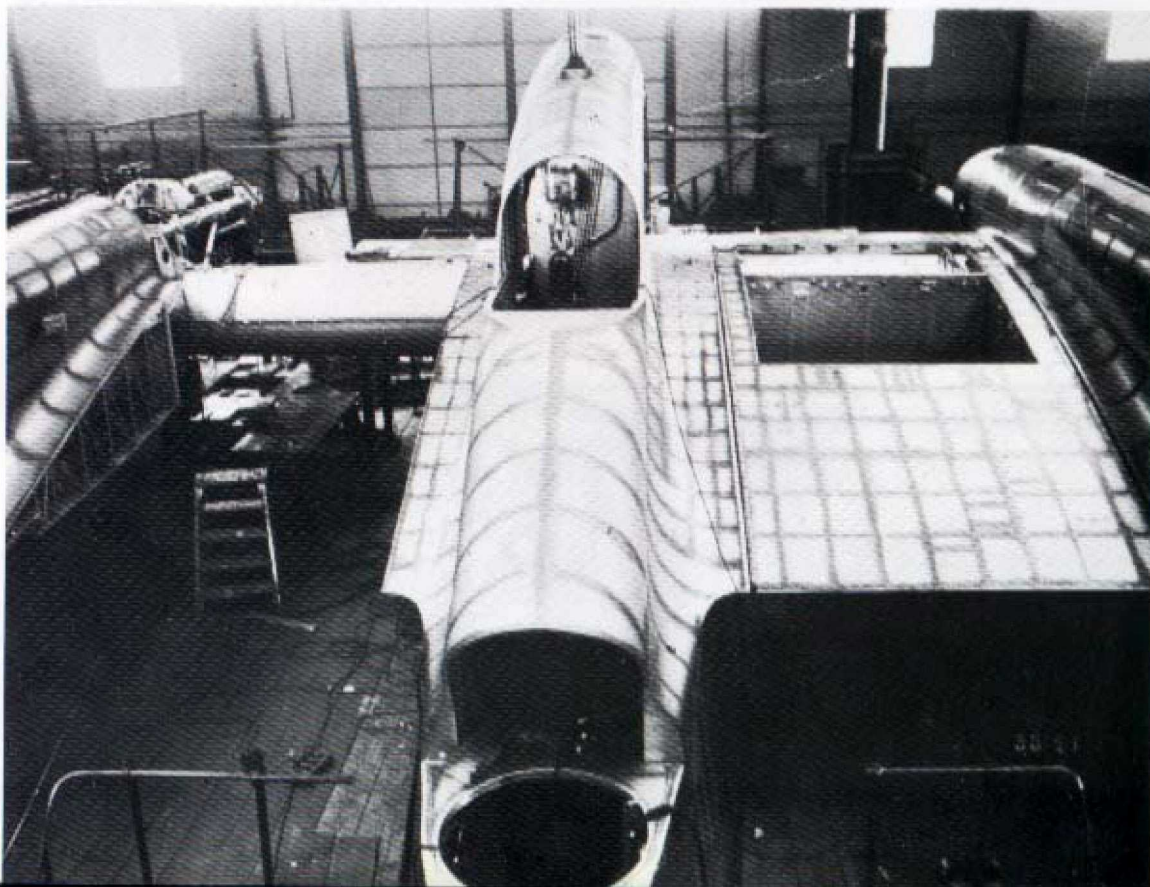


Bv 138 A-01 is lowered into the water in preparation for its first flight.



Above:

Bv 138 A-1 basic construction. In the background to the right are the individual components for the next aircraft.

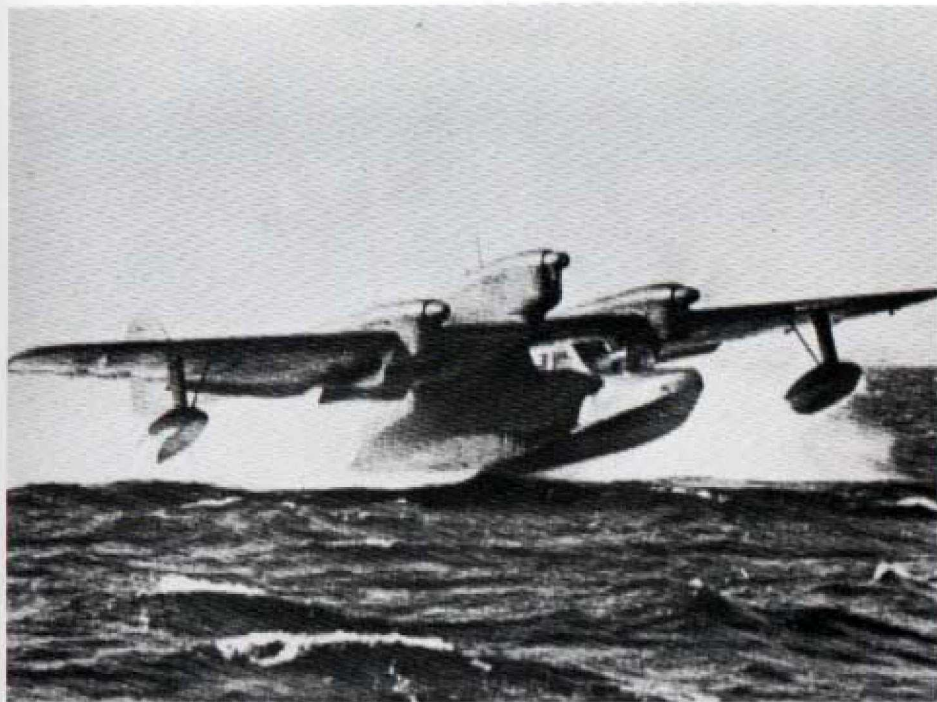


Left:

Series production of the Bv 138 A-1 in Finkenwerder. This photo shows the tubular wing spar characteristic of designs from Dr. Vogt.

In the meantime, production began on the first of the A-1 variants, of which 25 were eventually built. The first Bv 138 A-01 took off in April of 1940. The need for transports in support of the invasion of Norway (Operation Weserübung) led to the first two A-01s being pressed into operations without prior flight testing in Travemünde. The remaining ten A-01s were delivered to Hörnum and there formed into an air-sea squadron. Difficulties kept cropping up with the LB 204, which meant that repair teams were constantly at work until the first MG 151s became available. In October 1940 all remaining flyable Bv 138 A-01s were transferred to France.

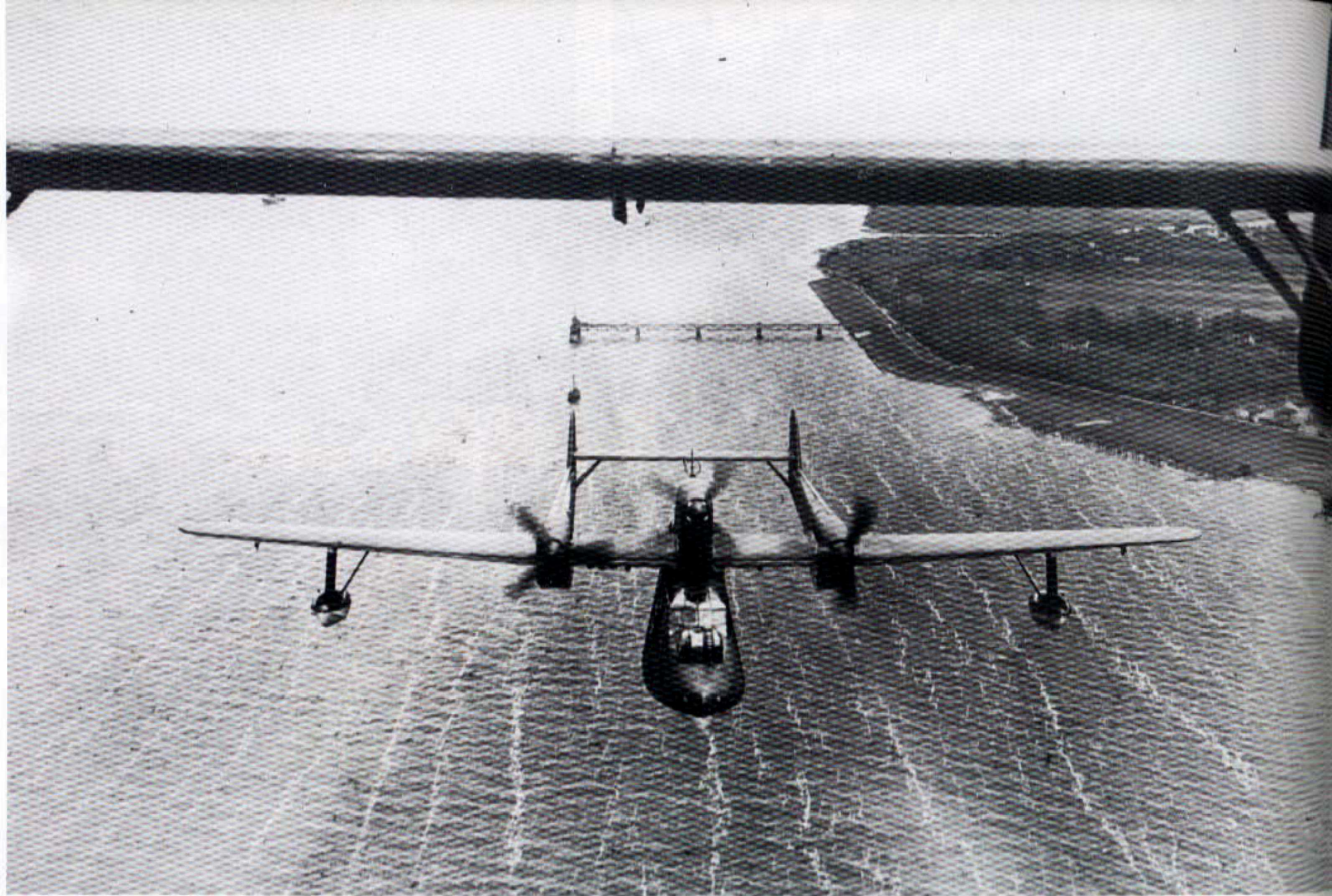
Three phases during takeoff of Bv 138 A-02, D-ARZT (later redesignated TJ+HS), on 5 October 1939. The machine bore factory number (Wk.Nr.) 149.



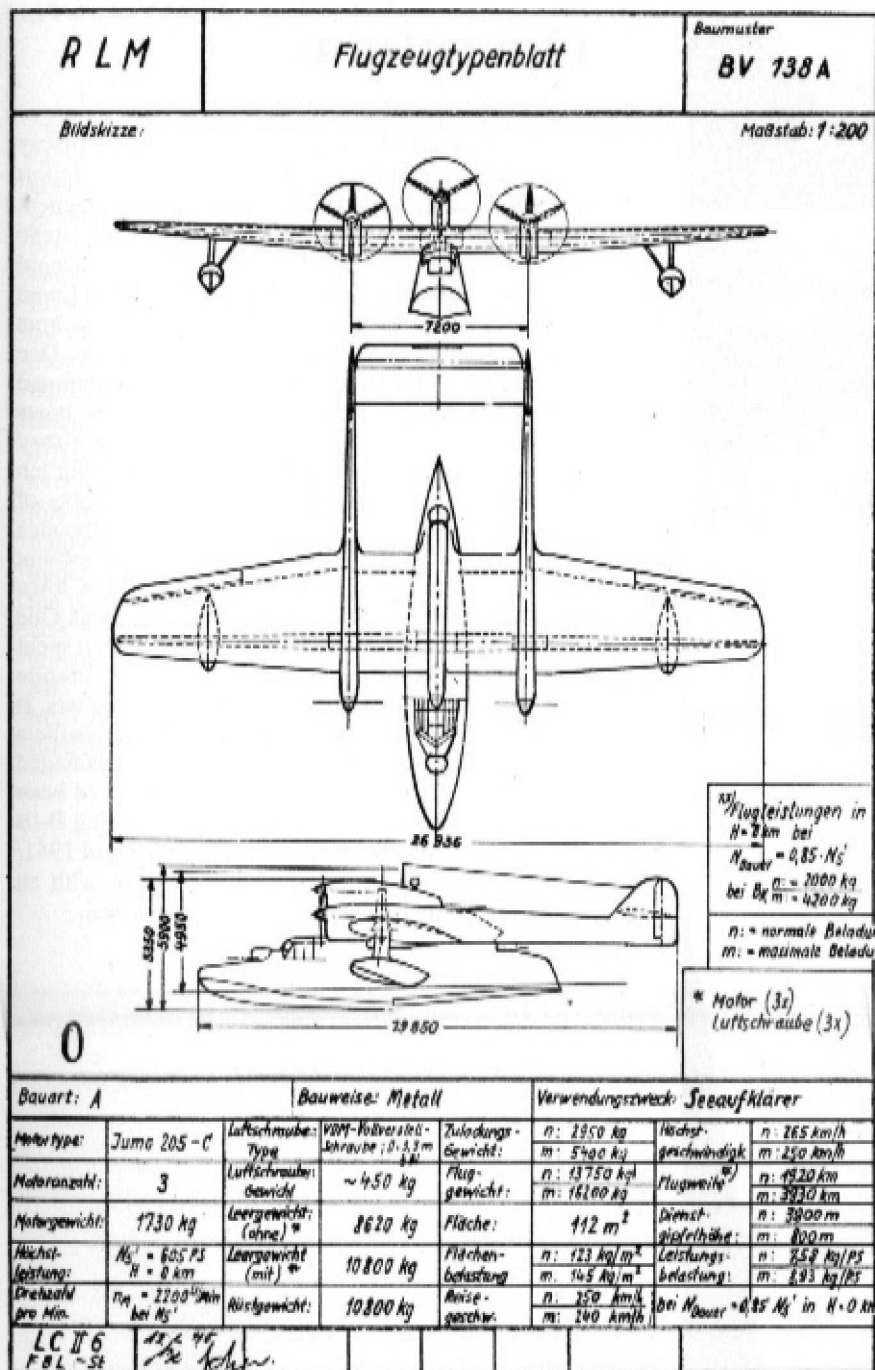
Above: The flying boat "steps up."

Center right: At the moment of liftoff.

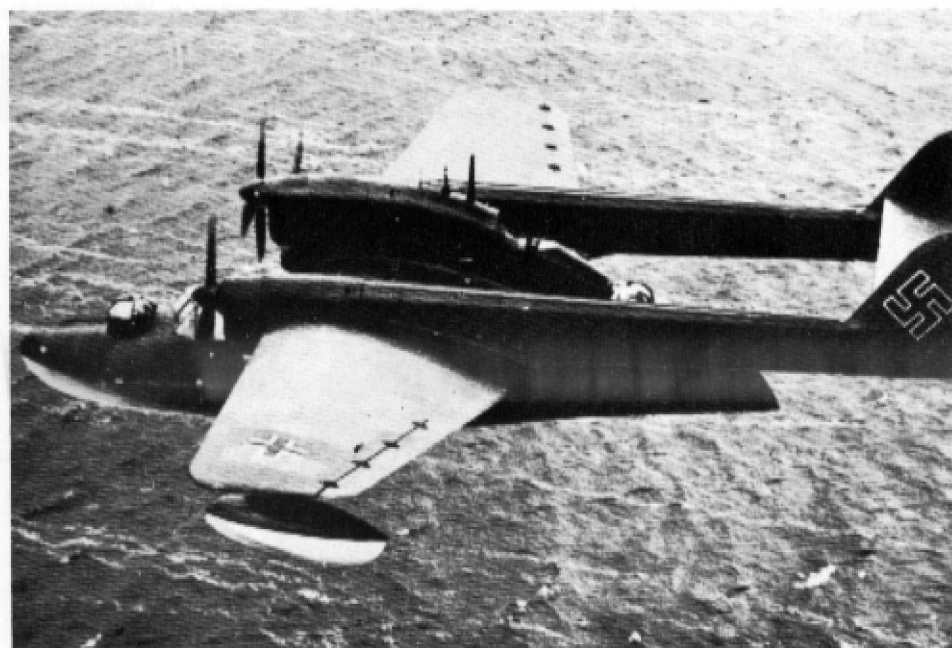
Below: After liftoff, seen climbing away.



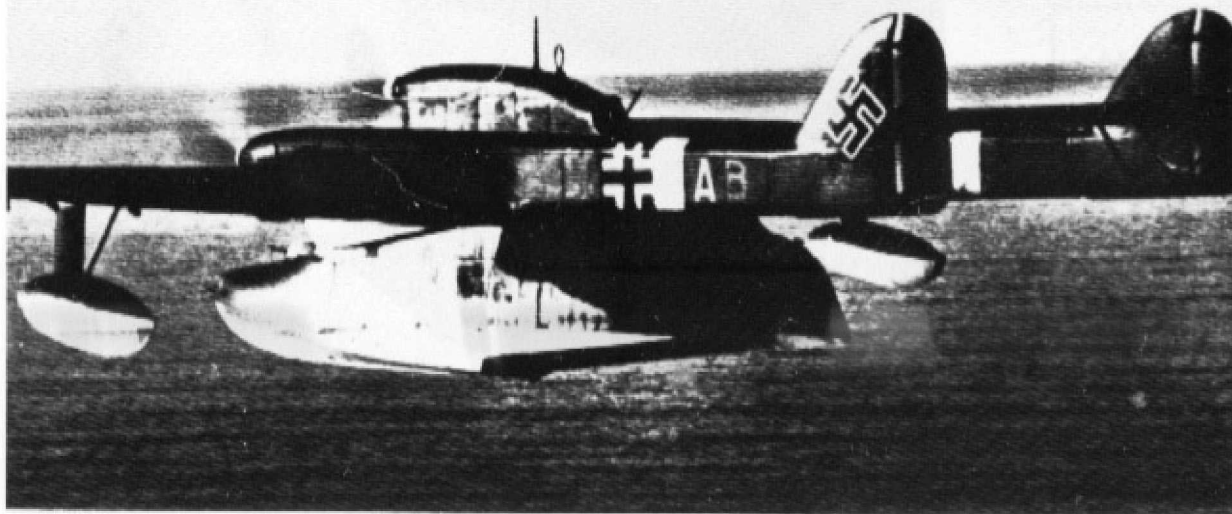
Bv 138 B-1 during its acceptance flight over the mouth of the Elbe.



An additional photo of a Bv 138 A-1 during its acceptance flight.



Bv 138 A-1 over the North Sea. The upper rear machine gun position is still open.



Above: Bv 138 B-1 over the Black Sea. The yellow bands on the booms were painted on all aircraft operating in the East.

Below: View from the pilot's seat of a Bv 138, looking down on the LB 204 turret ahead.

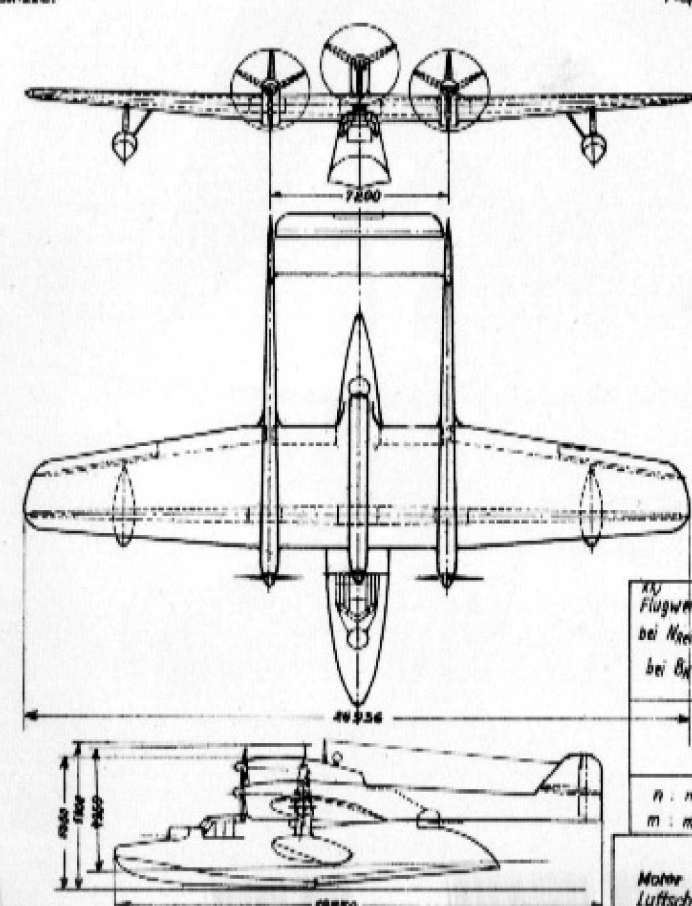


Operations

The flying boat's operations in the Bay of Biscay and over the Atlantic revealed that the hull, support floats and landing flaps all had to be strengthened. Happily, it was possible to incorporate these modifications to the Bv 138 B-1, which was delivered from December 1940 onward. In the winter it was found that the exhaust feed of the center engine became blocked, leading to a 70 hp drop in performance. Due to the ice flows, the Bv 138 was only able to be returned to front-line service in June of 1941. In July the boats were assigned to new bases in Norway, where they achieved good results. One Staffel, equipped with ten Bv 138 B-1s, flew a total of 500 hours in October of 1941. This equated to 100,000 km of reconnaissance patrol! The Bv 138 B-1 also showed that it could account for itself in combat: a British Blenheim was shot down in air-to-air combat, as was a Catalina flying boat. One Bv 138 proved to be particularly resilient when it spent 1 1/2 hours monitoring an English convoy - despite repeated attacks from British carrier-borne fighters. It remained on station while torpedo planes and bombers struck the convoy, then returned to its base - damaged but safe. By the end of 1941 three Bv 138s had been lost. In the interim, all Bv 138 As and remaining B-0s were brought up to B-1 standards. In the winter of 1941/42 more Bv 138s were assigned to Norway, with an additional Staffel being posted to the Black Sea.

Modifications

In the spring of 1941 production finally came to a halt on the B-1 series, of which a B-1/U1 variant was built with racks for six SC 50 bombs or four depth charges for attacking submarines. The subsequent Bv 138 C-1 series generally corresponded to the B-1, but differed externally primarily by the four-bladed propeller fitted to the center engine. The first seven aircraft of the series were delivered in March of 1942. A total of 72 Bv 138 C-1s had been built by the end of 1942. Although the Bv 138 construction program was classed into the highest prioritization category, bottlenecks in the supply of raw materials and the increasing frequency of Allied air raids from 1942 led to continuous difficulties in delivering aircraft. All Bv 138s were eventually refitted with the new 880 hp Jumo 205 D when this more powerful engine became available. This engine required the addition of two more intake openings in the upper engine cowling, since the air inlet located behind the propeller spinner wasn't adequate by itself. Armament was increased for all variants: both nose and rear turrets with an MG 151/20 each, upper rear gun position with an MG 131. Provisions were made for installing an additional MG 15 machine gun in the starboard side which could be fired by the radioman.

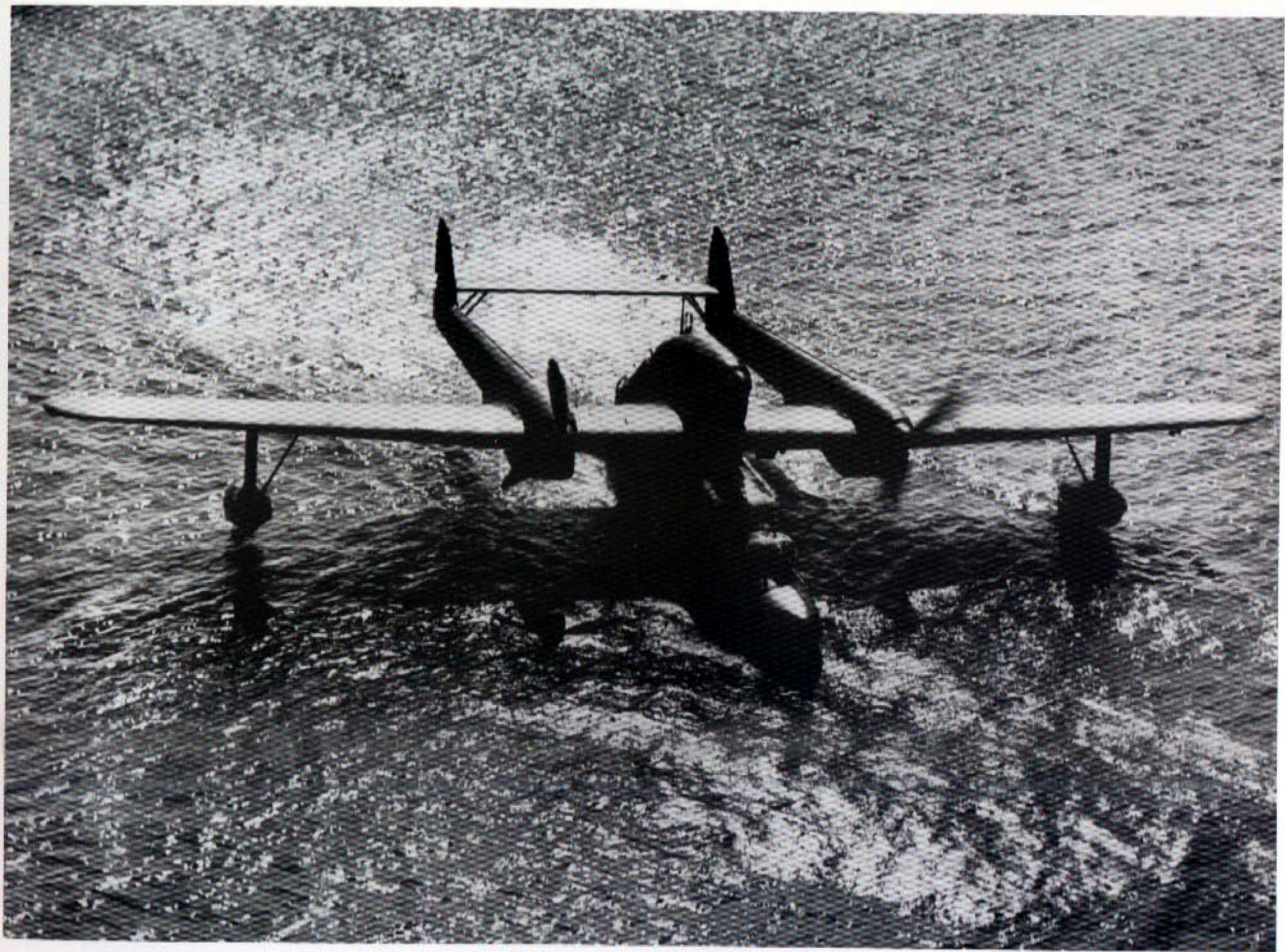
RLM		Flugzeugtypenblatt		Baumuster					
				BV 138 B BV 138 C					
Bildskizze:				Maßstab: 1:200					
		<div>xy Flugweite in H=0 km bei $N_{\text{max}} = 0,7 \cdot N_g'$ bei B_1 $n = 2000 \text{ kg}$ $m = 4400 \text{ kg}$</div> <div>n : normale Beladung m : maximale Beladung</div> <div>Motor (3x) Luftschraube (3x)</div>							
Staatsgeheimnis!									
Geheimhaltungsvorschriften beachten!									
Bauart: B		Bauweise: Metall		Verwendungszweck: Seeaufklärer					
Motortype:	Jumo 205-D	Luftschraube: Type	VDM-vollgerstellte Hase mit Leinwand-Verkleidung	Zuladungs-gewicht:	n : 3035 kg m : 4095 kg	Höchst-geschwindigkeit:	n : 235 km/h m : 270 km/h	N=0 km	
Motoranzahl:	3	Luftschraube: Gewicht	~ 450 kg	Flug-gewicht:	n : 14390 kg m : 17400 kg	Flugweite ^{xy}	n : 1840 km m : 3380 km		
Motorgewicht:	1950 kg	Leergewicht: (ohne) *	8355 kg	Fläche:	112 m ²	Dienst-gipfelhöhe:	n : 4200 m m : 2300 m		
Höchst-leistung:	$N_g' = 880 \text{ PS}$ H = 0 km	Leergewicht: (mit) *	11355 kg	Flächen-belastung	n : 128,5 kg/m ² m : 155,3 kg/m ²	Leistungs-belastung:	n : 5,15 kg/PS m : 6,59 kg/PS		
Drehzahl pro Min.	$n_n = 2800 \frac{1}{\text{Min}}$ bei N_g'	Rüstgewicht:	11355 kg	Reise-geschw.	n : 250 km/h m : 235 km/h	bei $N_{\text{reise}} = 0,7 \cdot N_g'$ für 4-0 km			
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View from the center engine looking down on the pilot's compartment and the LB 204 gun turret.



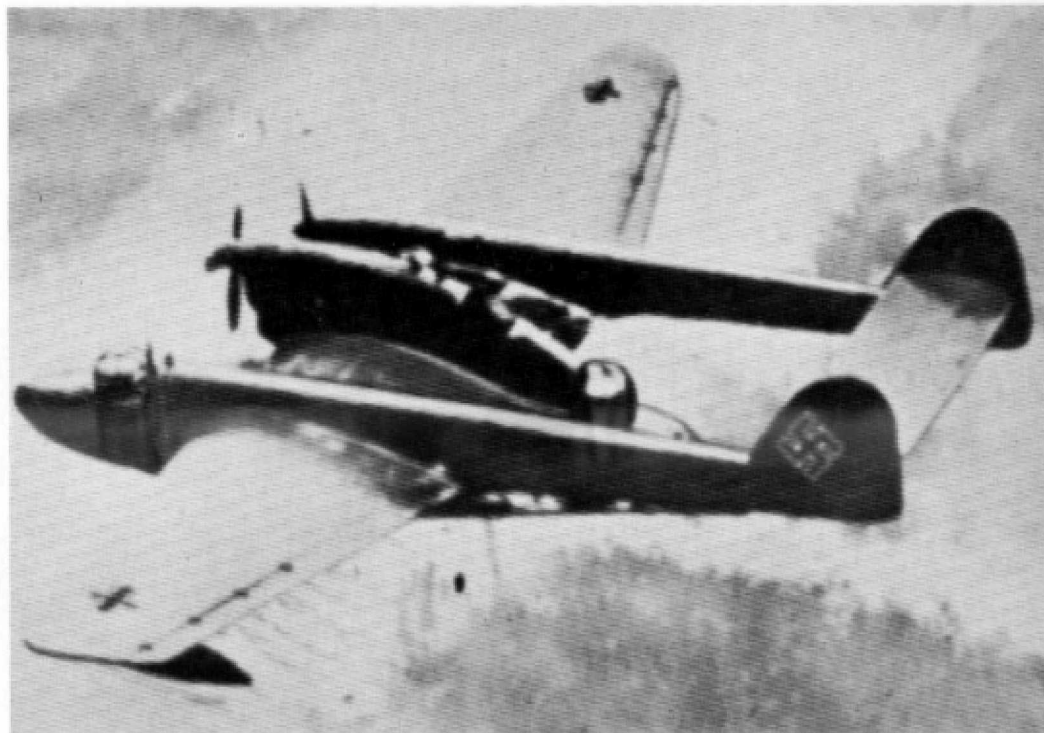
*Above:
Despite the bad weather, ground personnel of a Seefliegerstaffel are still at work somewhere along Norway's western coast ensuring their aircraft are always operationally ready. Working from a rubber dinghy, they use long poles to clear the snow from the wings.*



Once the machine was in the water, two engines were sufficient to power the flying boat to shore.



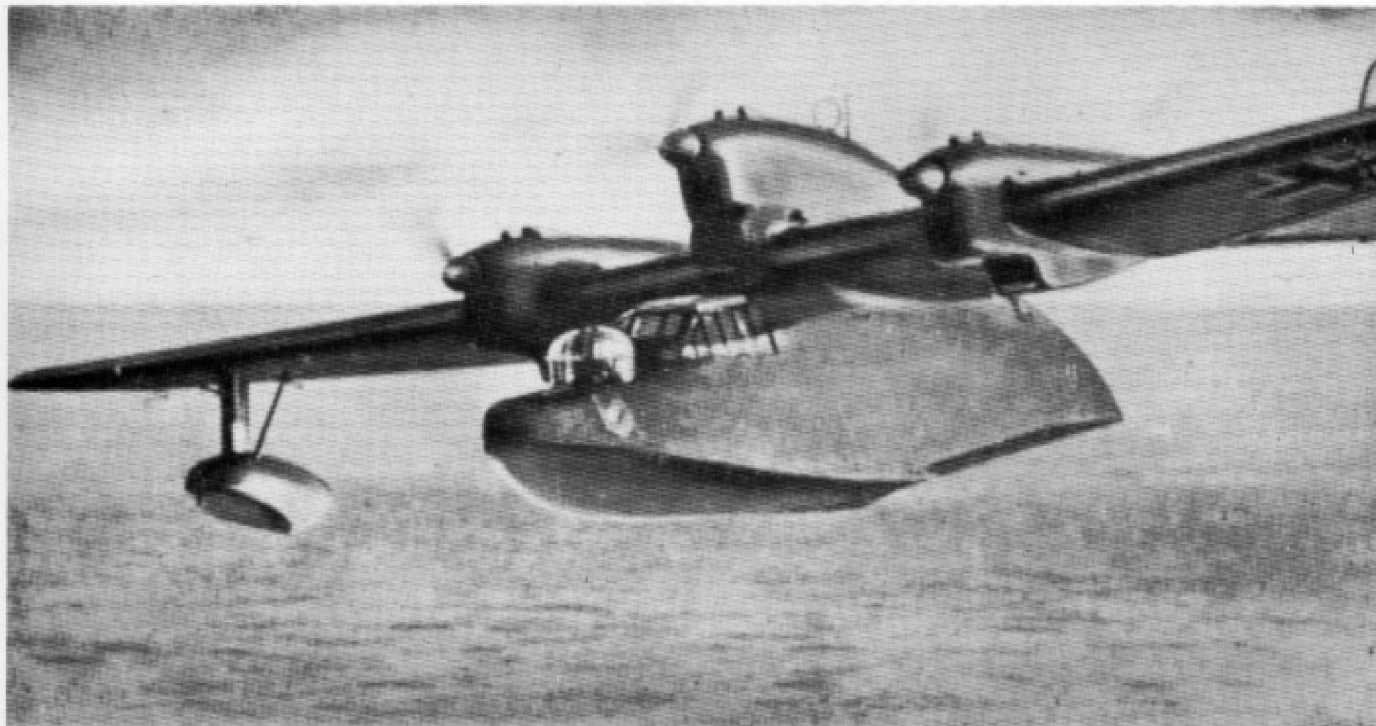
Above: A seaplane base on the Black Sea. Two Bv 138s are at rest in the foreground, while behind them is a Do 24 (BA).



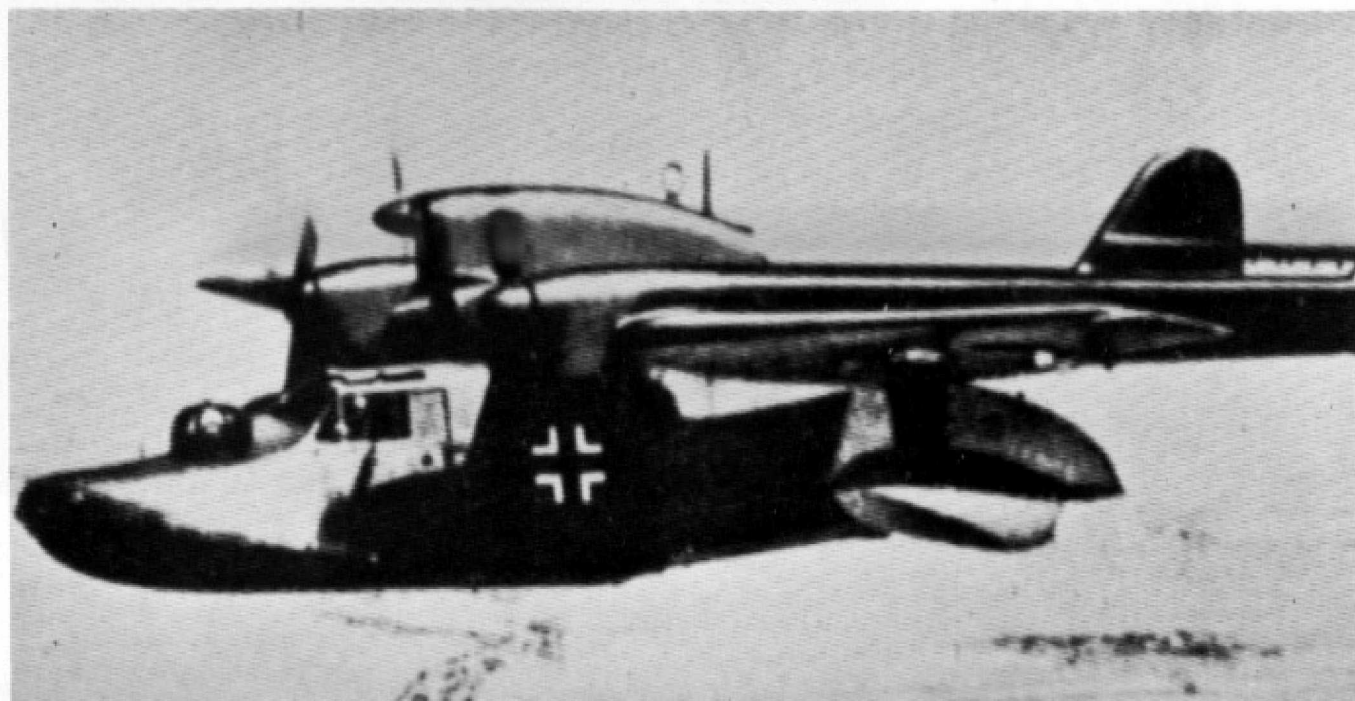
Above right: This air-to-air photo shows the layout of the Bv 138 C-0's defensive armament and their firing arcs to good effect. In practice the Bv 138 could only be safely attacked directly from below.



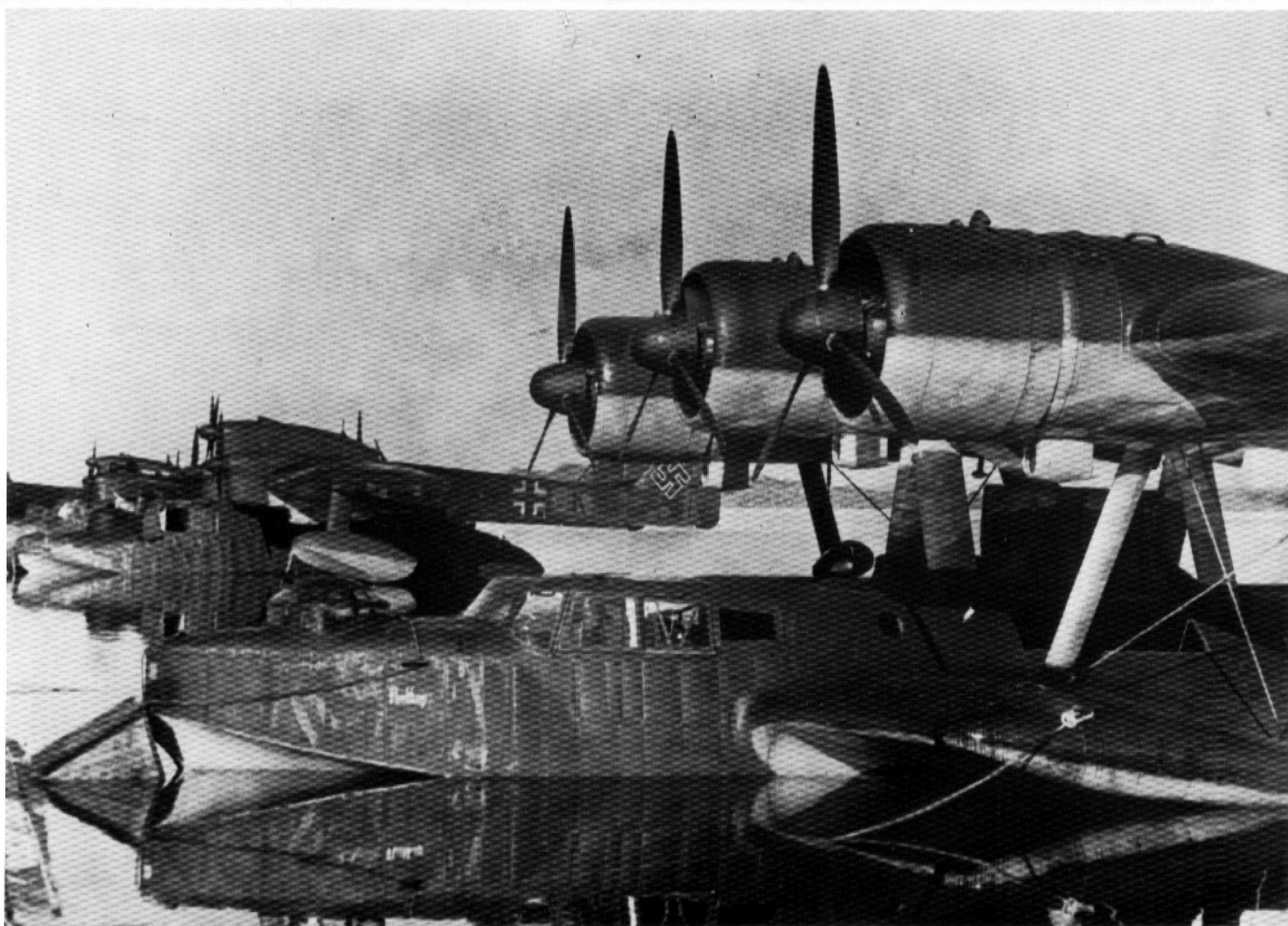
Right: Wreckage of a Bv 138 after an unsuccessful catapult launch in Tromsø. This Bv 138 had also suffered misfortune earlier in Copenhagen.



*Left:
Bv 138 C of 2 Staffel,
Küstenfliegergruppe 406, on its
landing approach. Notice the unit's
emblem on the nose.*



*Right:
Bv 138 B-1 during a test flight over
Friesland.*



* Typical scene at a maritime support facility in Norway. The Do 24 in the foreground has been given the moniker "Nordkap" (North Cape); behind it are three Bv 138 C-1s.

The U 1 factory conversion set (which consisted of 6 x SC 50 bombs or four 150 kg depth charges) could also be fitted to the C-1. A limited number of Bv 138 C-1s were equipped with a mine degaussing ring, a large electrically charged circular ring as was also fitted to the Ju 52. In order to provide the flying boat with the maximum range possible, a number were modified for catapult launching. The aircraft were launched from the same ships which had made possible the Deutsche Lufthansa's air mail routes to South America before the war, when they were stationed in the south Atlantic. When launched from a catapult the Bv 138 C-1 could remain airborne for 18 hours, equating to a patrol range of 3,900 km. All Bv 138s could be fitted with RATO packs. The Bv 138 was also utilized in small numbers as a personnel transport, whereby ten fully equipped infantry troops could be carried. A few Bv 138 C-1s were also given the FuG 200 Hohentwiel radar for sniffing out and maintaining contact with enemy shipping convoys.

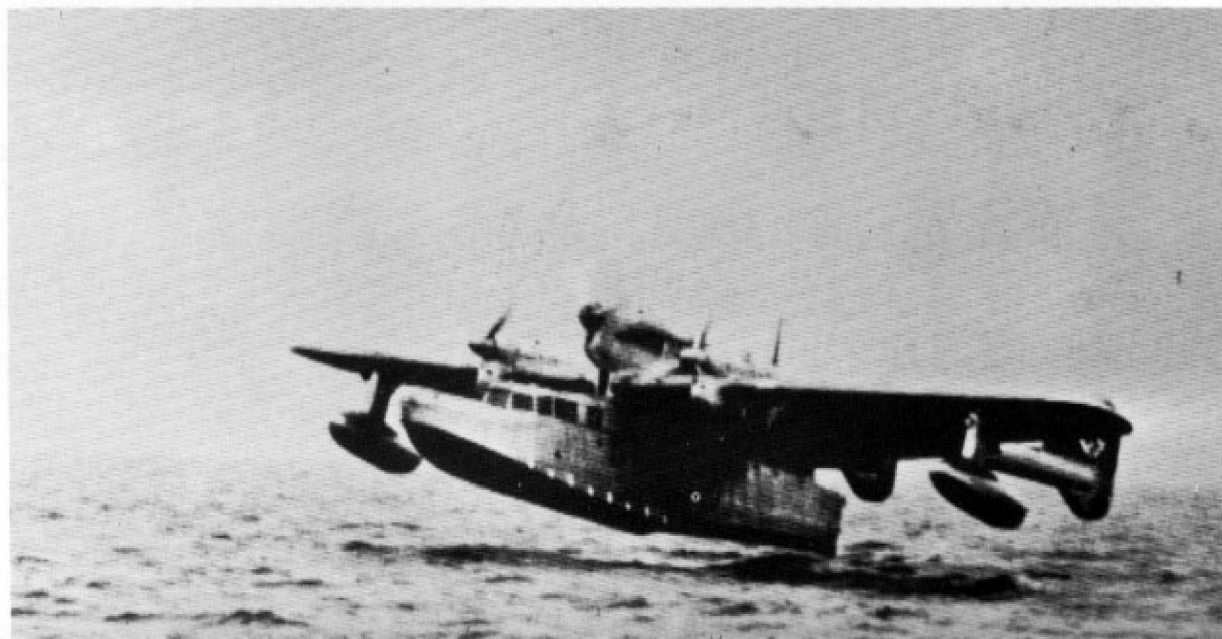
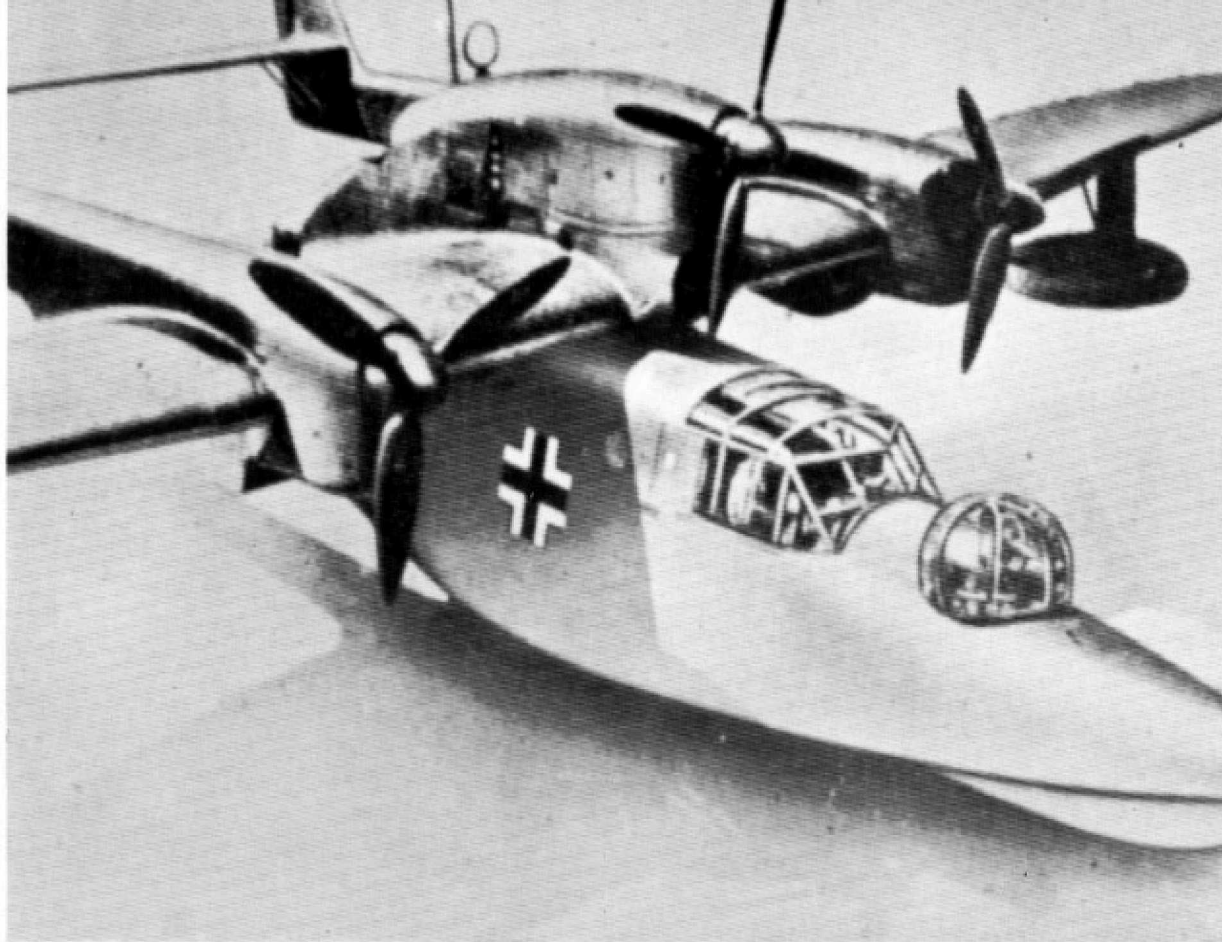
A total of 276 Bv 138 flying boats were built, of which 25 were A-1s, 24 were B-1s and 227 were C-1s. In addition, three A-1 variants were converted to B-1s.

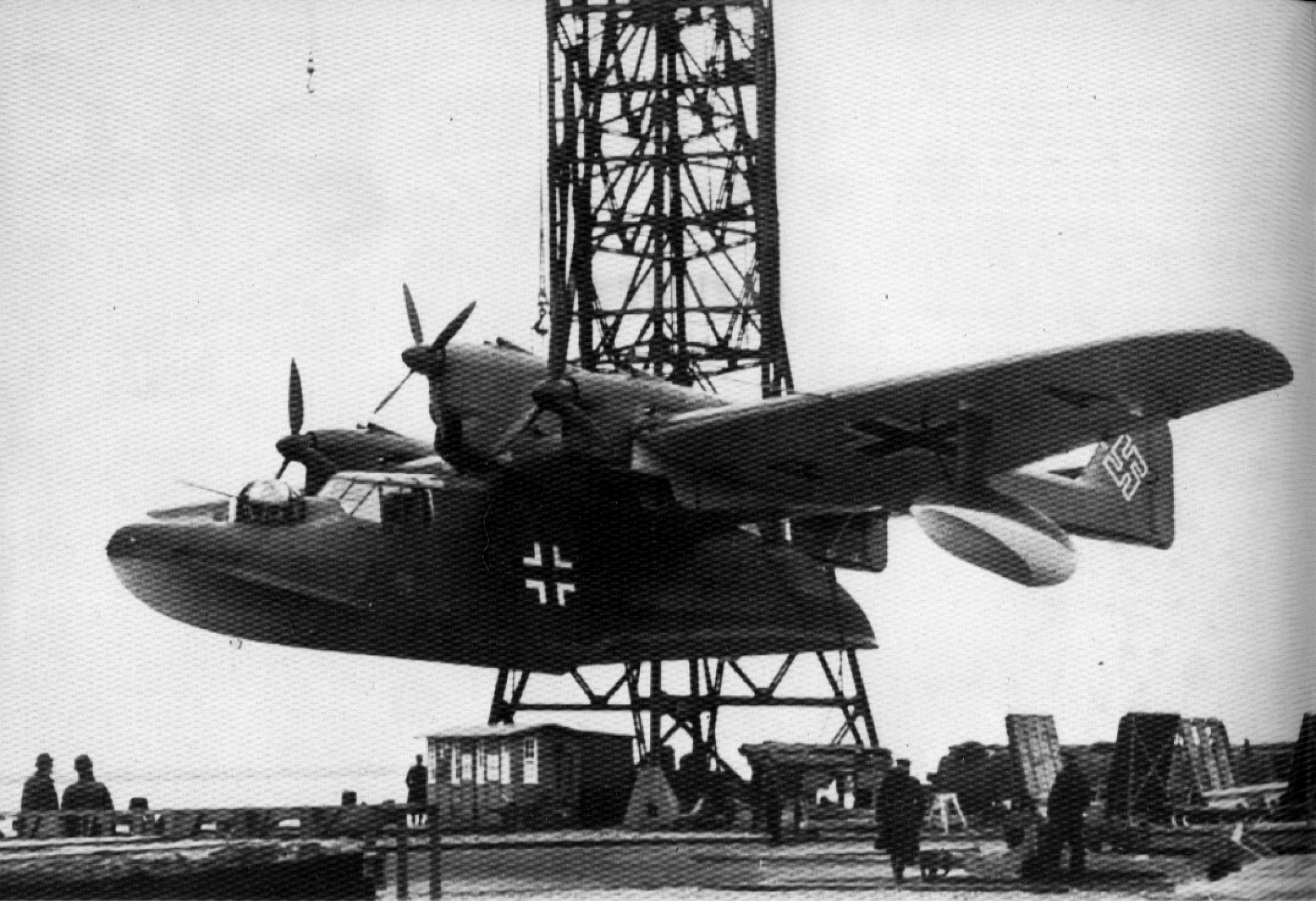
Above right:

This photo of a Bv 138 C-0 shows the new nose turret for the MG 151/20.

Right:

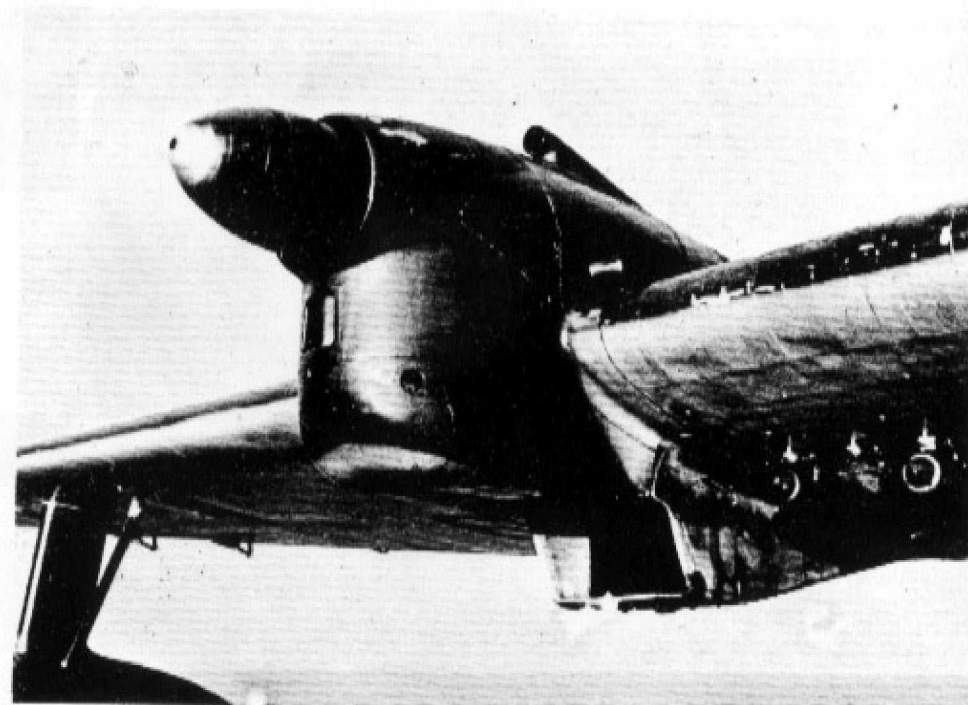
The Ha 138 V 2 just lifting off.





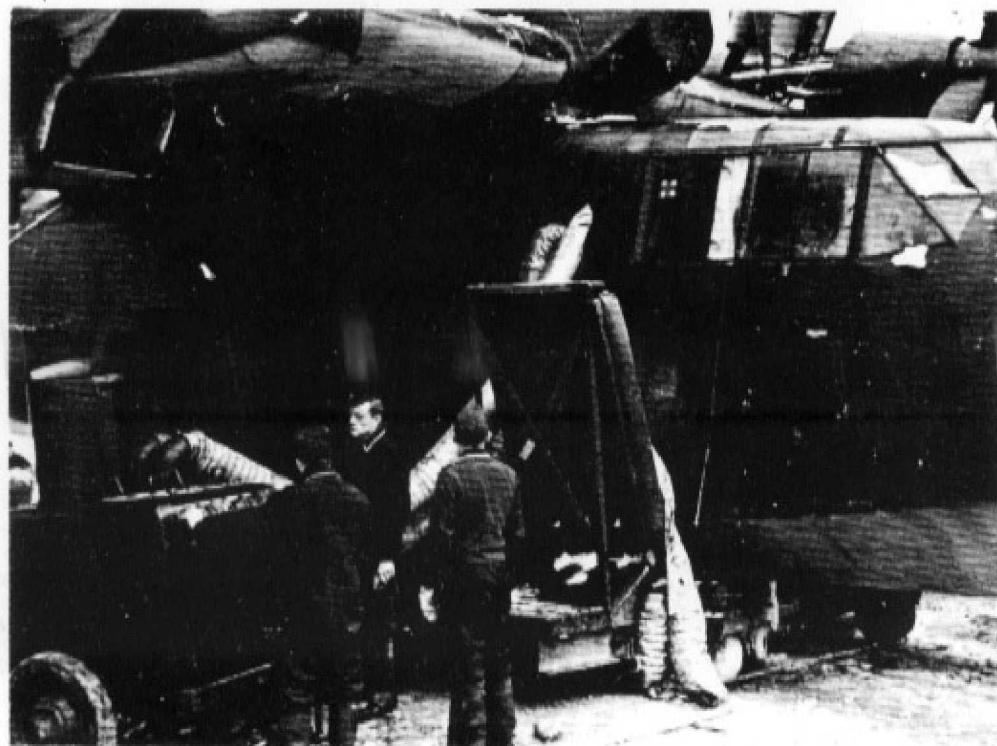
The Bv 138 was also built and repaired at Weserflug. This is a Bv 138 C-1 suspended from a crane at the facility's Einswarden Works.

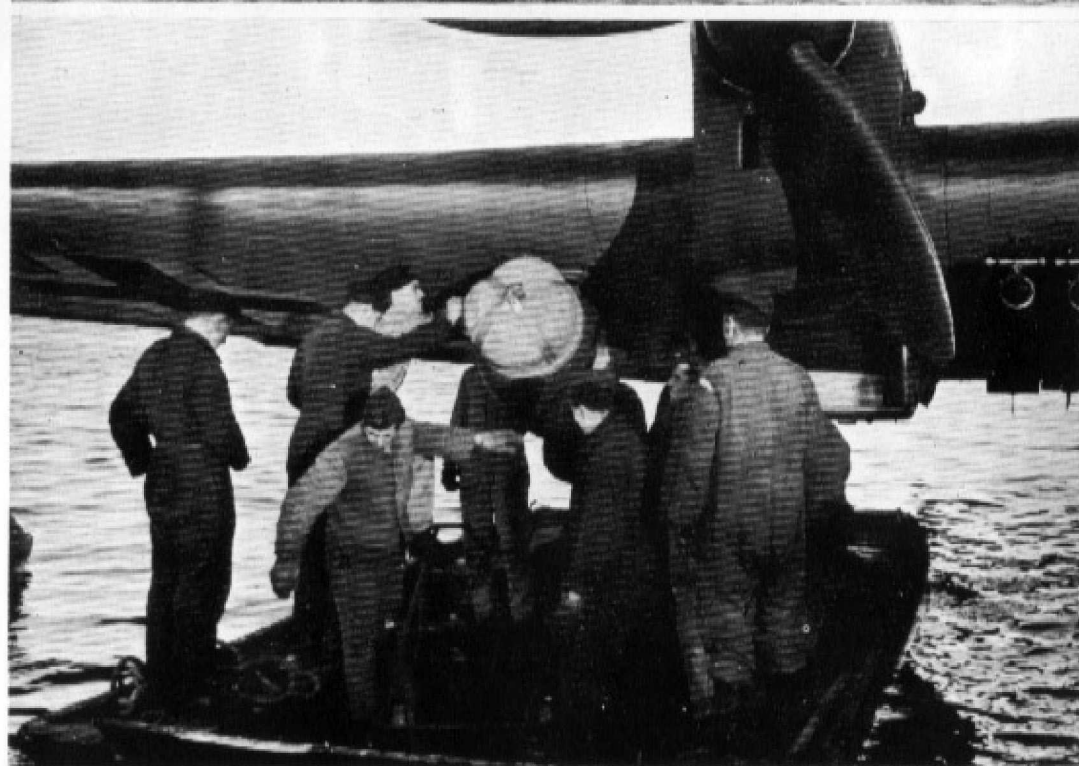
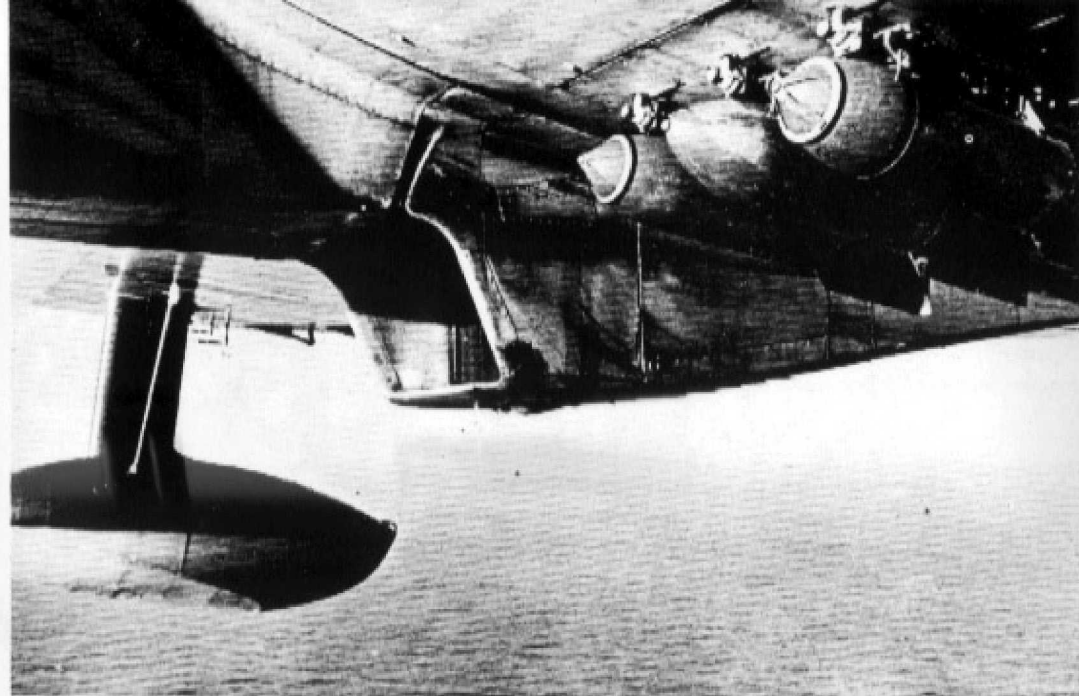
*Right:
Although the center engine had a front radiator, the outer engines
incorporated tunnel radiators beneath the wings.*



*Below:
Engine mechanics pre-warming the center engine.*

*Below right:
In the left part of this photo is the pre-warming apparatus with heater
hoses leading to the engines. Snow is scattered on the wings and hull.*

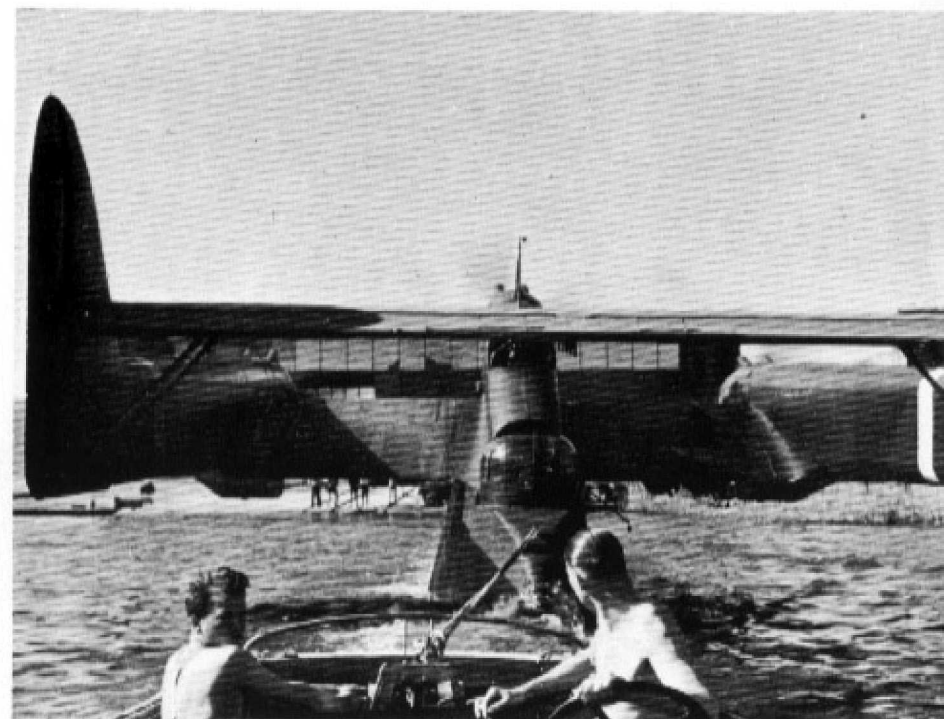
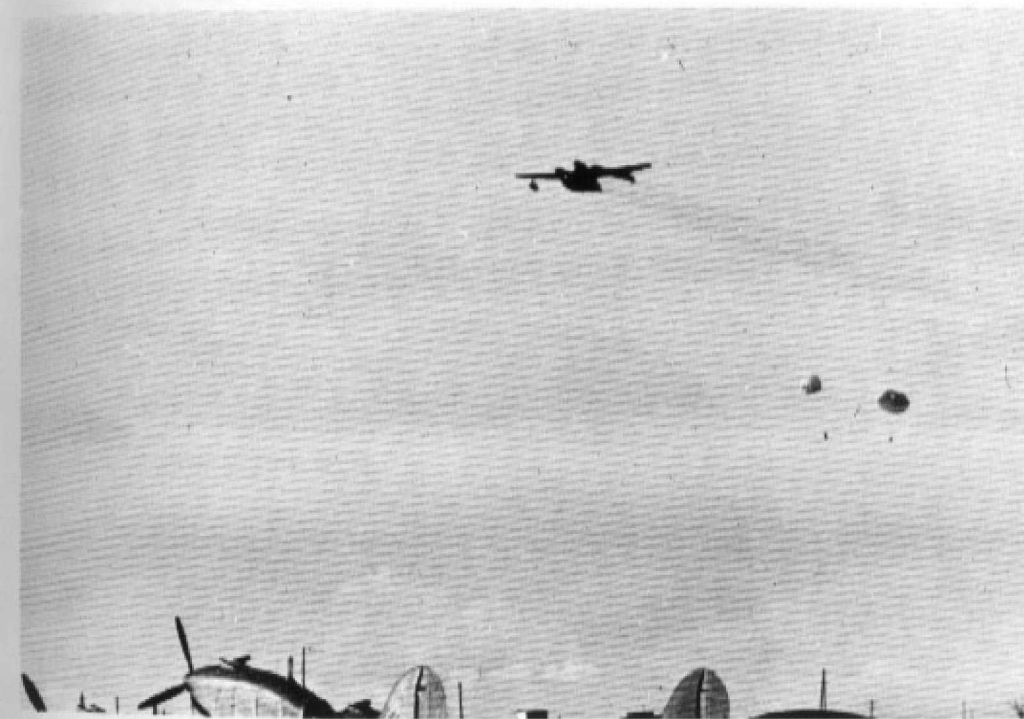




Above:
A submarine tows a Bv 138 home. The nose turret and its MG 151/20 of this Bf 138 C can be seen in detail here.

Above right:
Bomb carrying system on the Bv 138 B and C. Three general purpose SC 50 bombs suspended from ETC 50 racks.

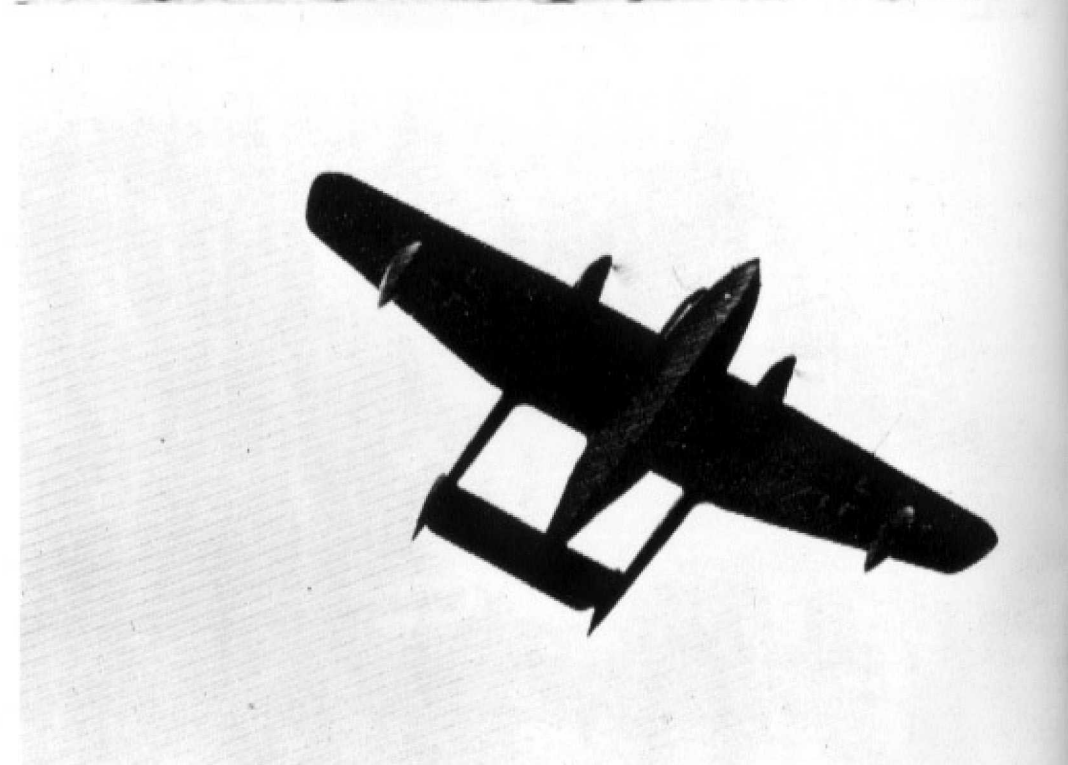
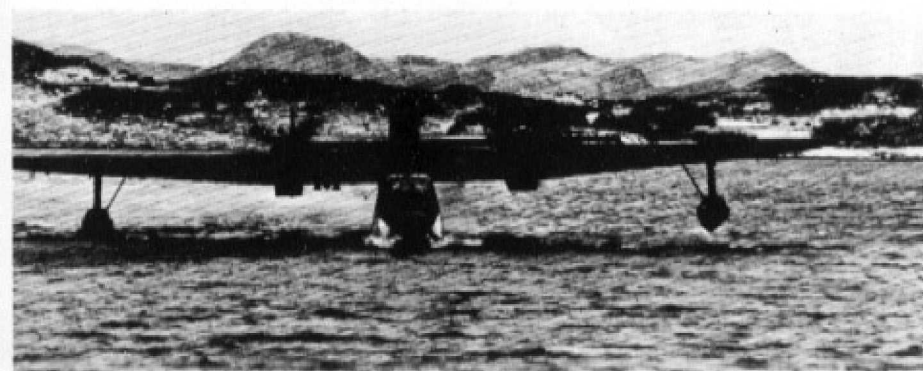
Right:
Here a supply canister with parachute is being loaded beneath the wing. The bomb load can be seen to the far right.



*Above right:
Here the supply canisters drift earthward, suspended from
their parachutes.*

*Above:
This picture shows a BV 138 being towed further away from
land by a motorboat in order to avoid a collision along the
rocky shoreline.*

*Left:
The ground crew was required to remove built-up salt from
the boat while it lay at rest. Plexiglas was particularly
sensitive to the effects of salt water.*



Upper photo:
Its engines slowly turning over, this Bv 138 taxis out of its base to an area where there's sufficient space for takeoff.

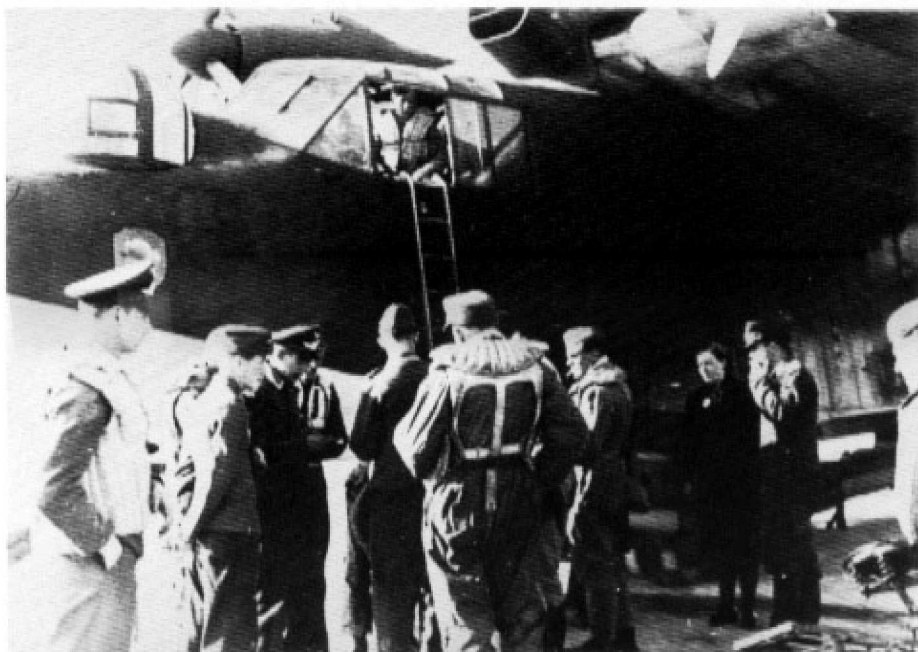
Above:
Already running at full throttle, the engines leave water fountains in their wake behind the boat.

Above right:
A Bv 138 C of 2/Kü.Fl.Gr. 406, taking off from a Norwegian fjord.

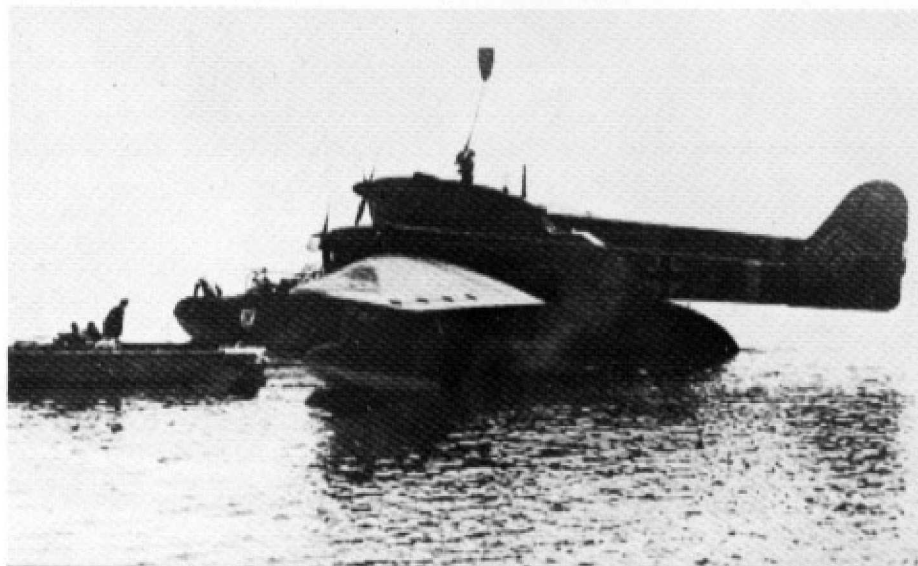
Right:
The K6 code beneath the wings indicate that this Bv 138 belongs to 2/Kü.Fl.Gr. 406.



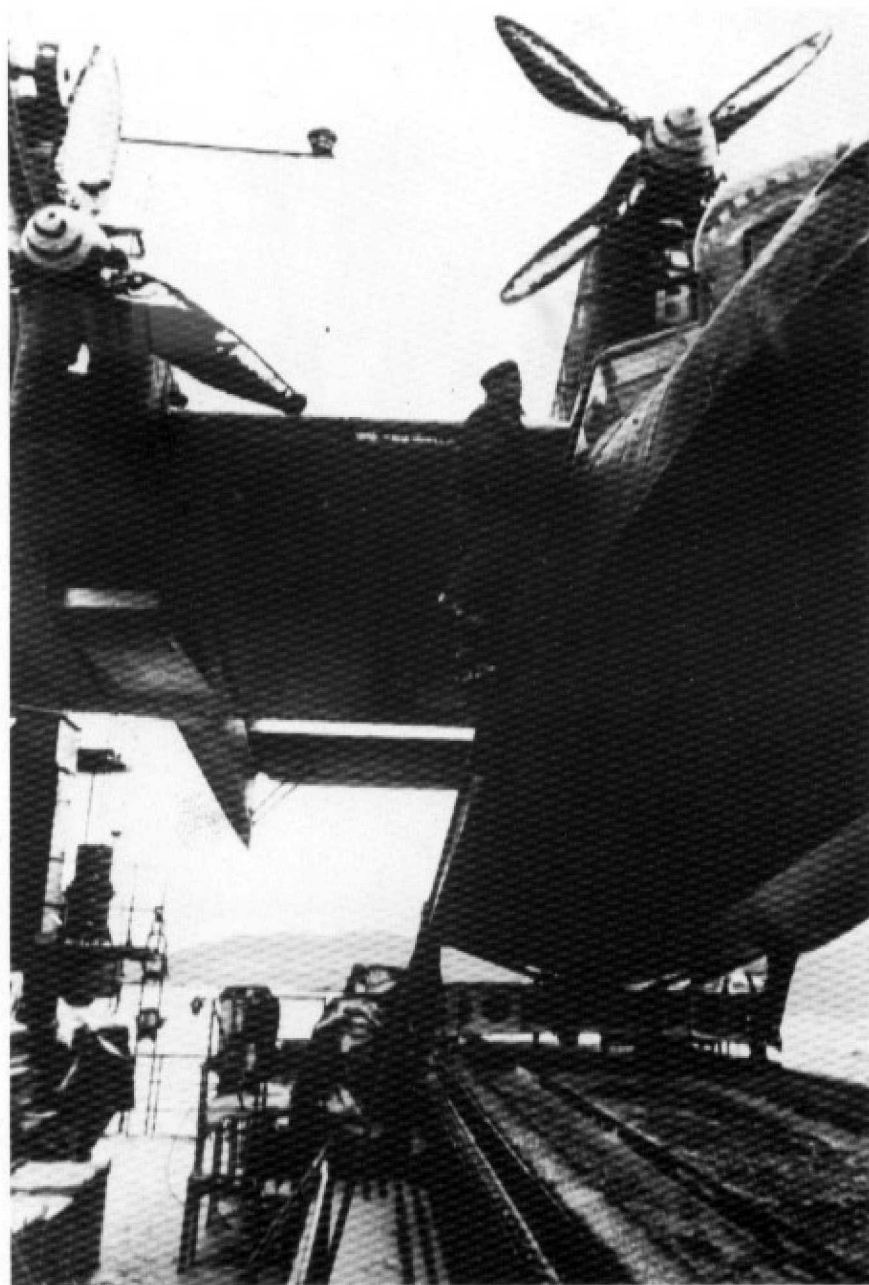
Bv 138 C-1 prior to being lowered into the water at the Einswarden Works of the Weser-Flugzeugbau.



Crew of a Bv 138 C-1 of 2/Kü.Fl.Gr. 406 prior to takeoff.



Bv 138 C-1 of 3 Staffel, See-Aufklärungsgruppe 125.



Bv 138 C-1 on the start cradle of the aircraft catapult.



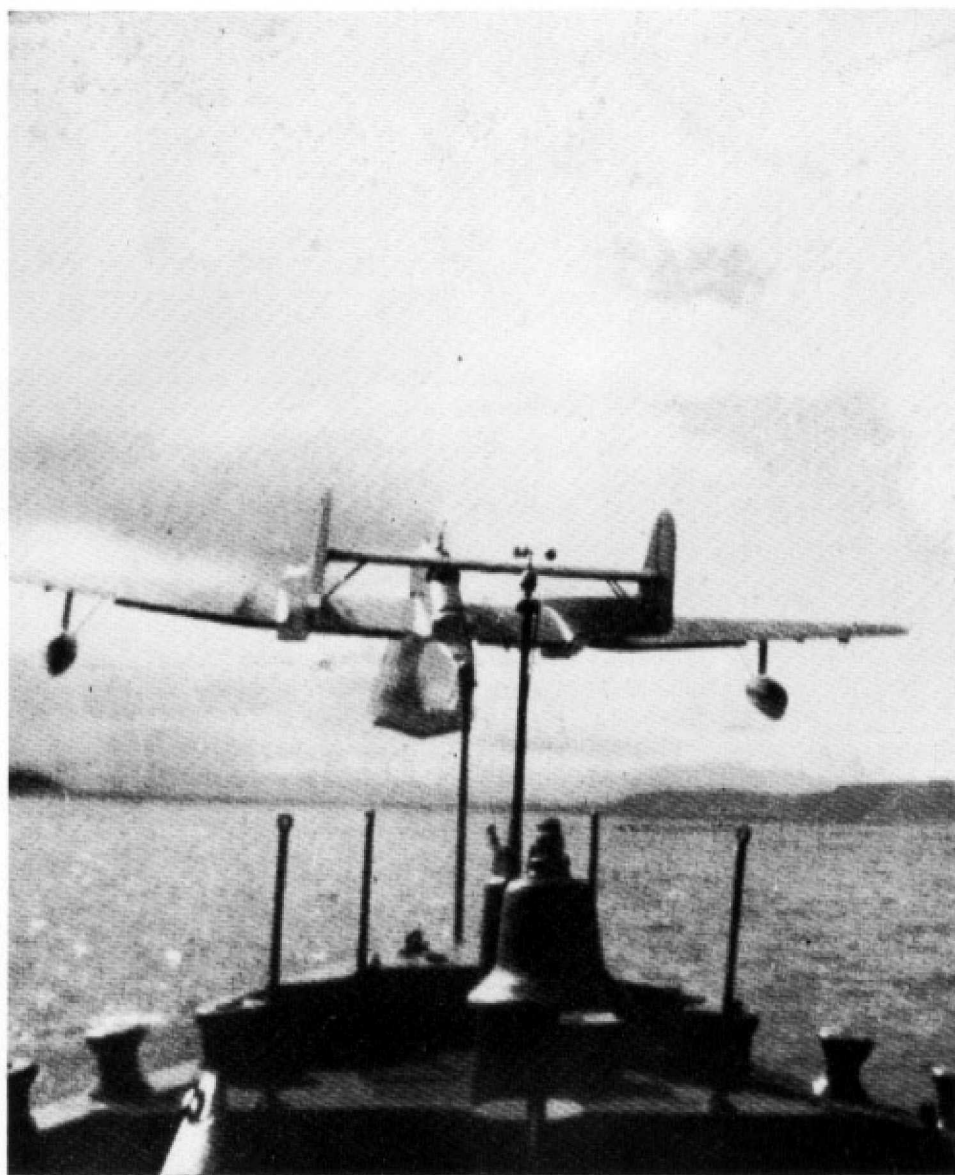
This photo shows several oddities: interesting is the fact that the horizon blue lower camouflage on the Bv 138 is carried up onto the fuselage side of the boat. The biplane flying boat behind it is probably a CAMS 37 captured in France, while pulling up the rear is a Heinkel He 114.



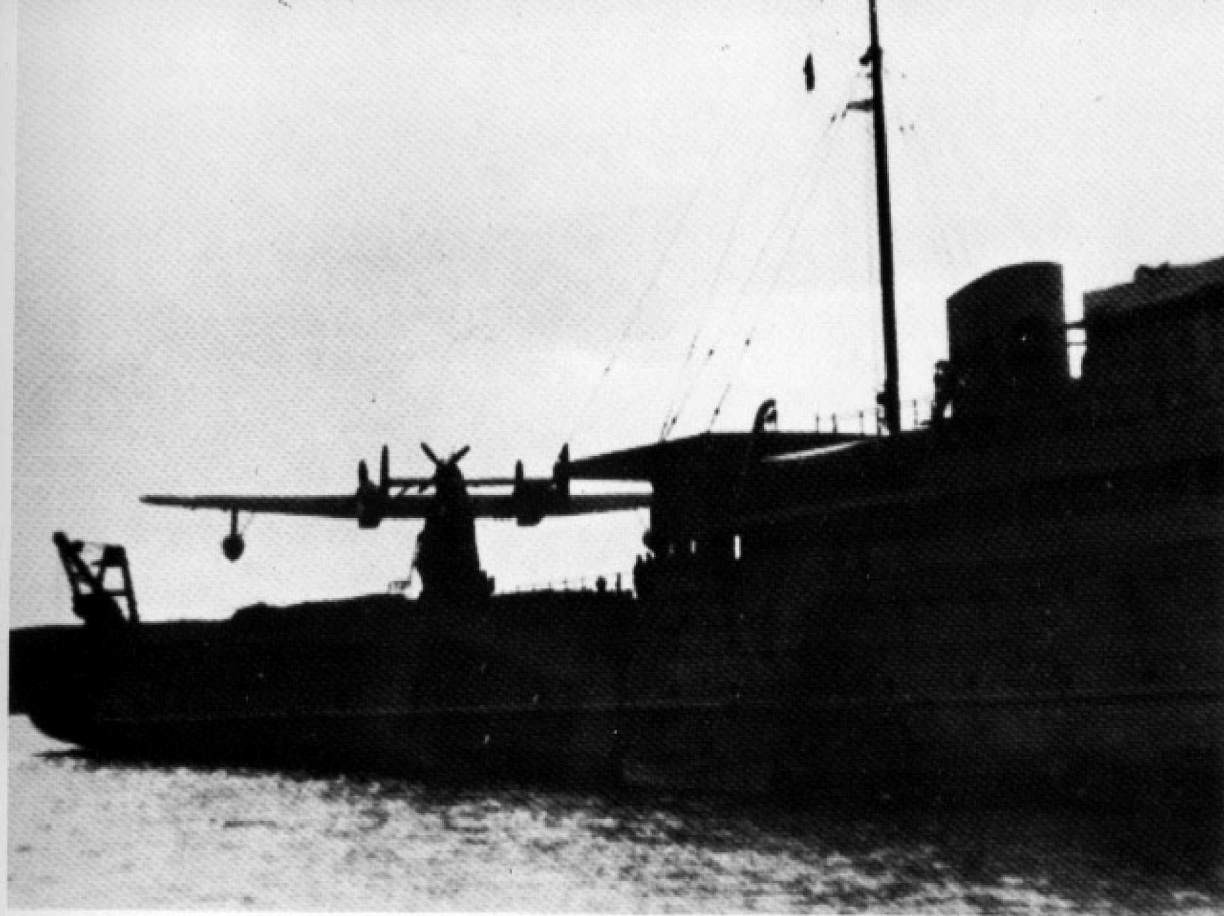
The catapult-equipped Sperber, a ship used for providing aircraft with navigational aid and rescue of downed aircrew, in Copenhagen in the summer of 1942.



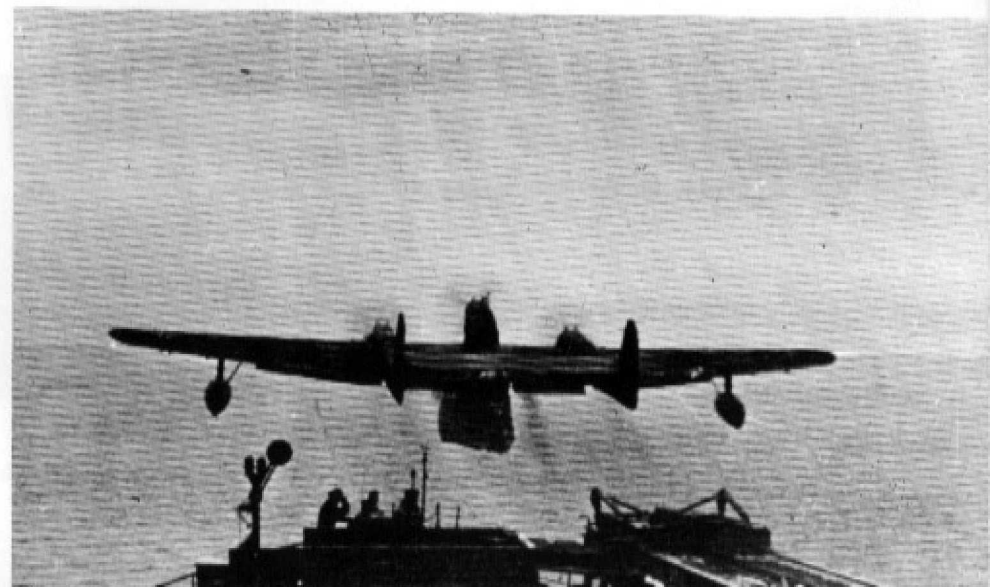
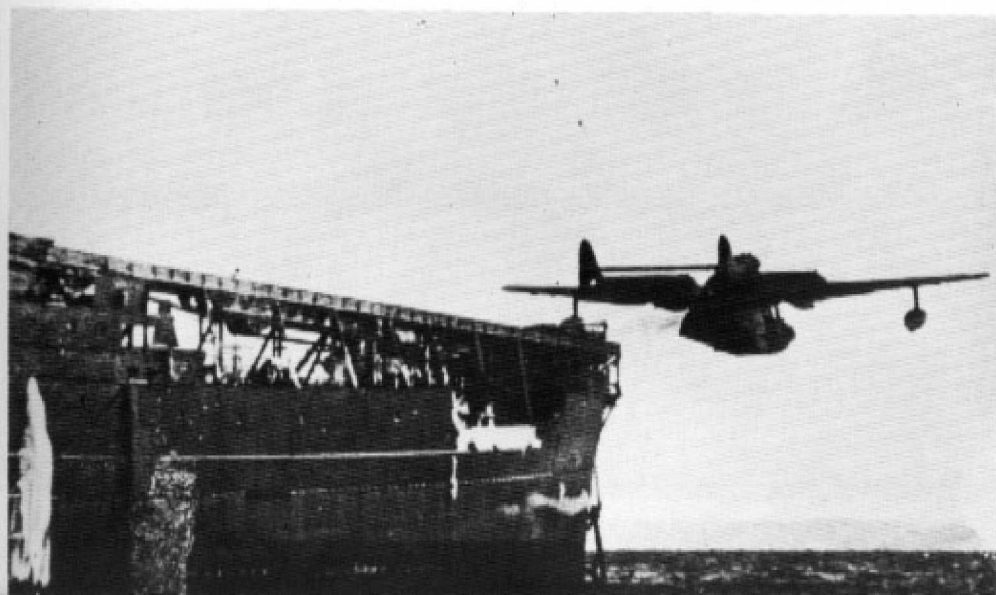
Bv 138 C-1 is lifted onto the Sperber's catapult.

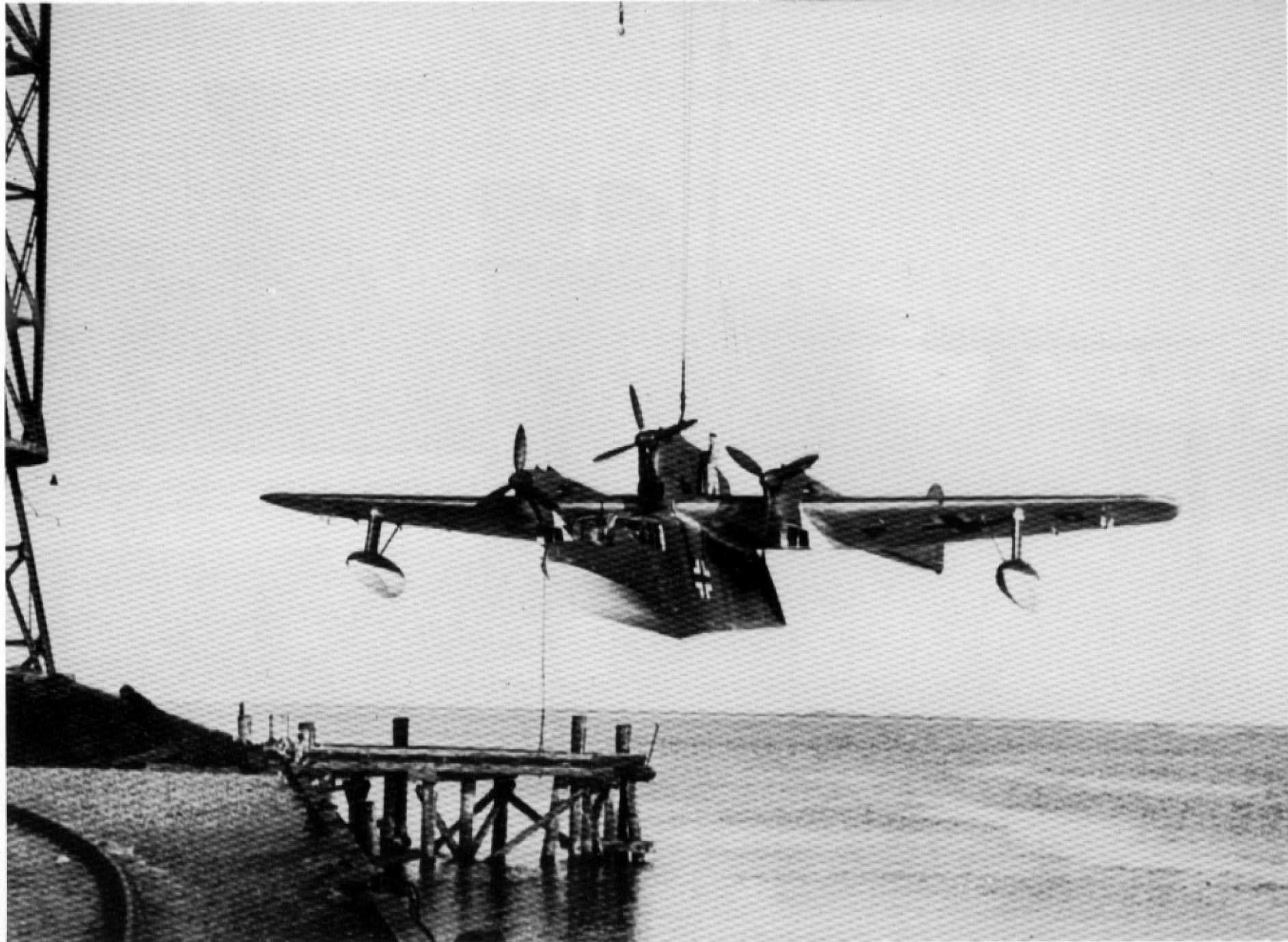


Good catapult launch of a Bv 138 from the Sperber.



These were the fruits of Lufthansa's experience in launching heavy flying boats from floating bases in the south Atlantic prior to 1939. The catapults were provided by the Heinkel company.

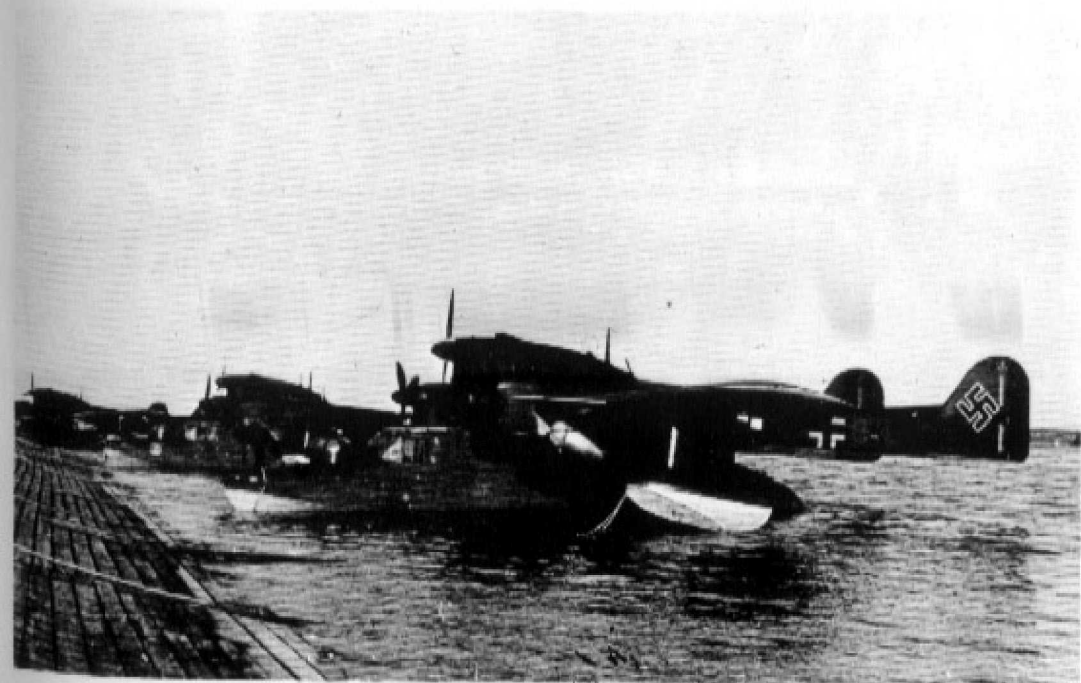




This photo of a Bv 138 C-1 at Weserflug in Einswarden shows the arrangement of the tunnel radiators for the three engines quite well.



*Above right:
Rumanian visitors at 3/See-Aufkl.Gr., which was stationed in the Black
Sea. These boats played a critical role in the evacuation of Kerch.*



*Left:
Three Bv 138s of 3/KüFl.Gr. 406 at a Norwegian base.*

*Above:
Nose and pilot's compartment of a Bv 138. Nose turret with MG 151/20.
Weather and sea have left their marks on the hull.*



*Above left:
A Bv 138 pilot in the cockpit; in front of him can be seen the Reflexvisier
(Revi) sight for dropping bombs.*

*Above:
Bv 138 observer and navigator plotting out the course. The Bv 138 did not
have dual controls, as can be seen.*



*Left:
The Bv 138 was required to have a comprehensive radio system for its
assigned role. The radio operator sat with his back to the pilot and
observer.*



Left:

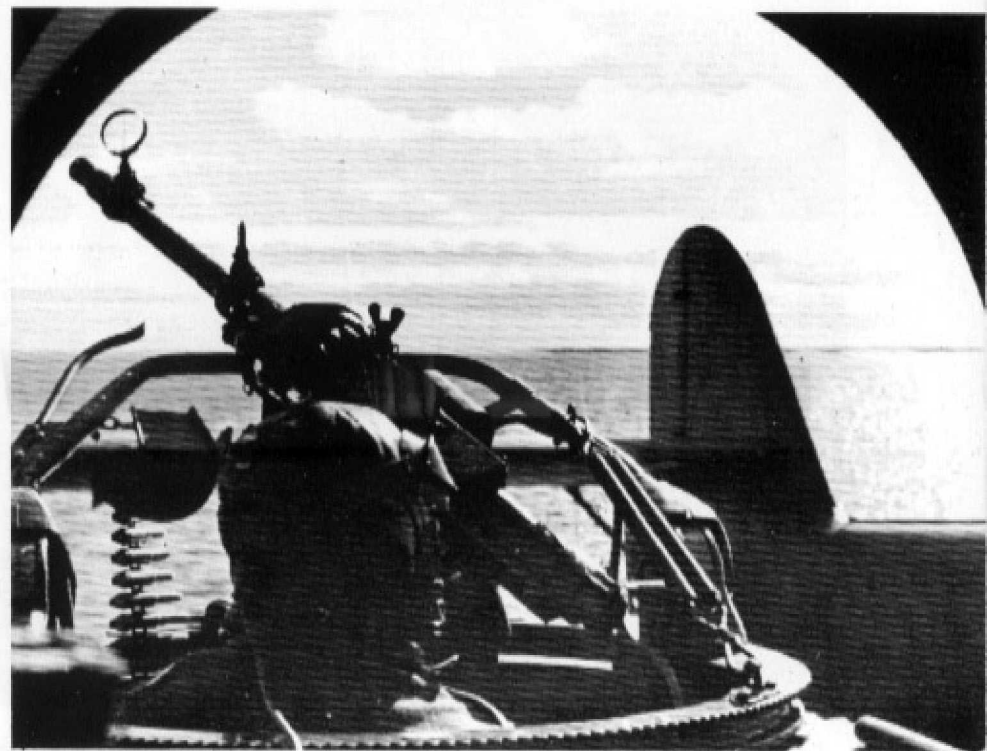
This is a good photo showing the ideal firing arc for the upper rear machine gun station with its MG 131.

Below left:

It can be seen that the rudder offers little cover for a potential attacker.

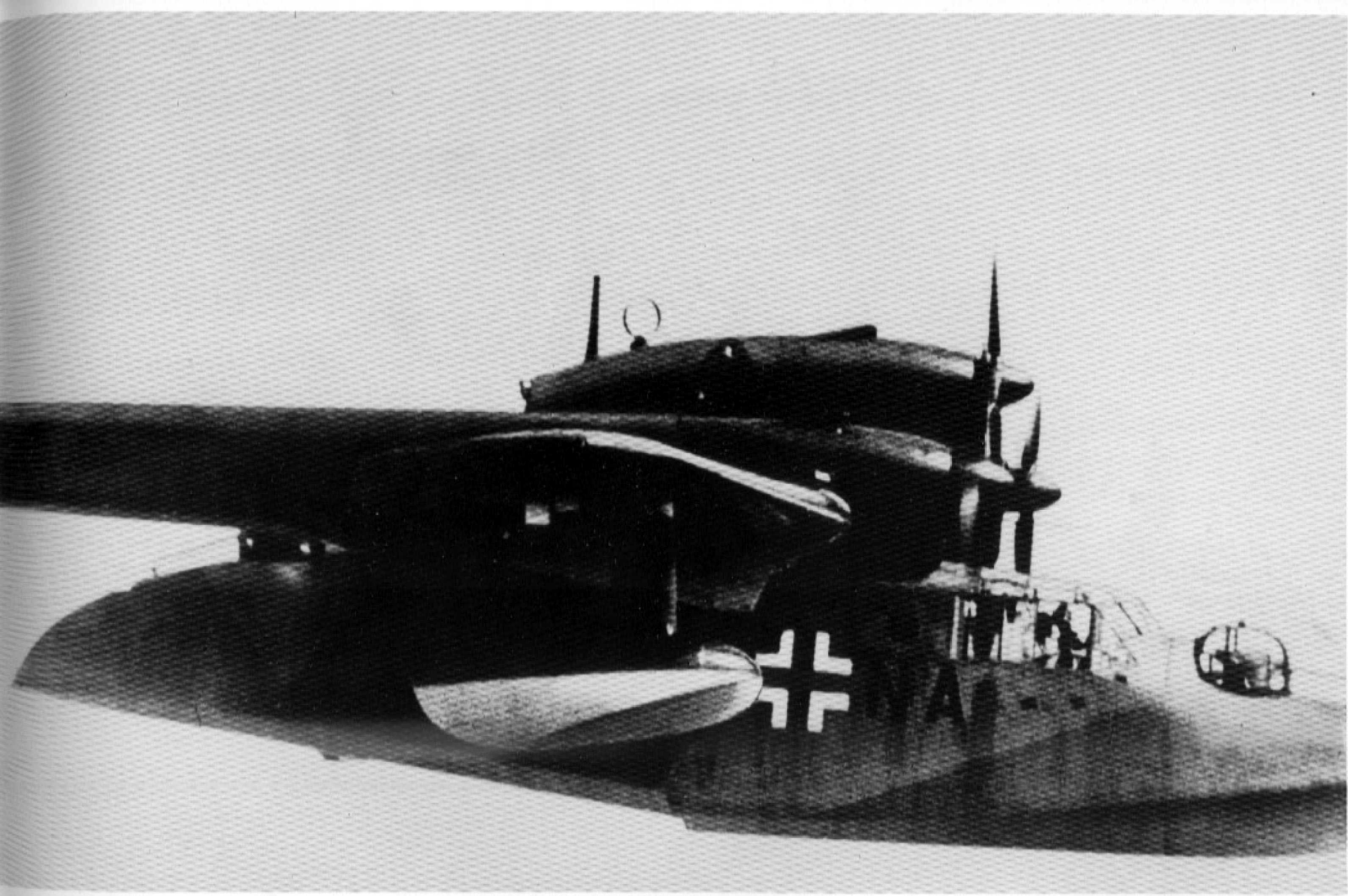
Below:

This photo also shows the nearly unlimited field of fire for the upper rear gunner's position to good effect.

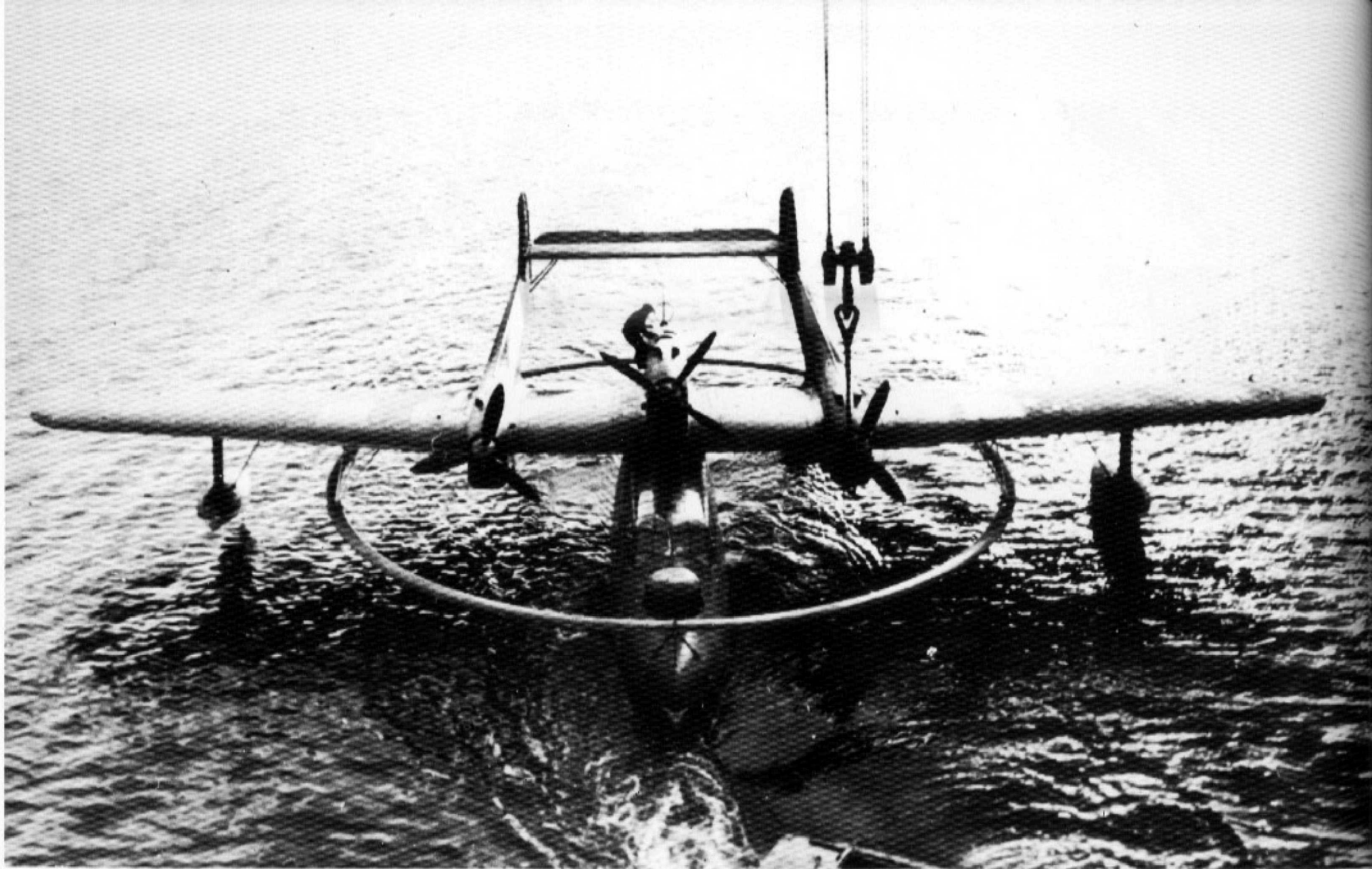




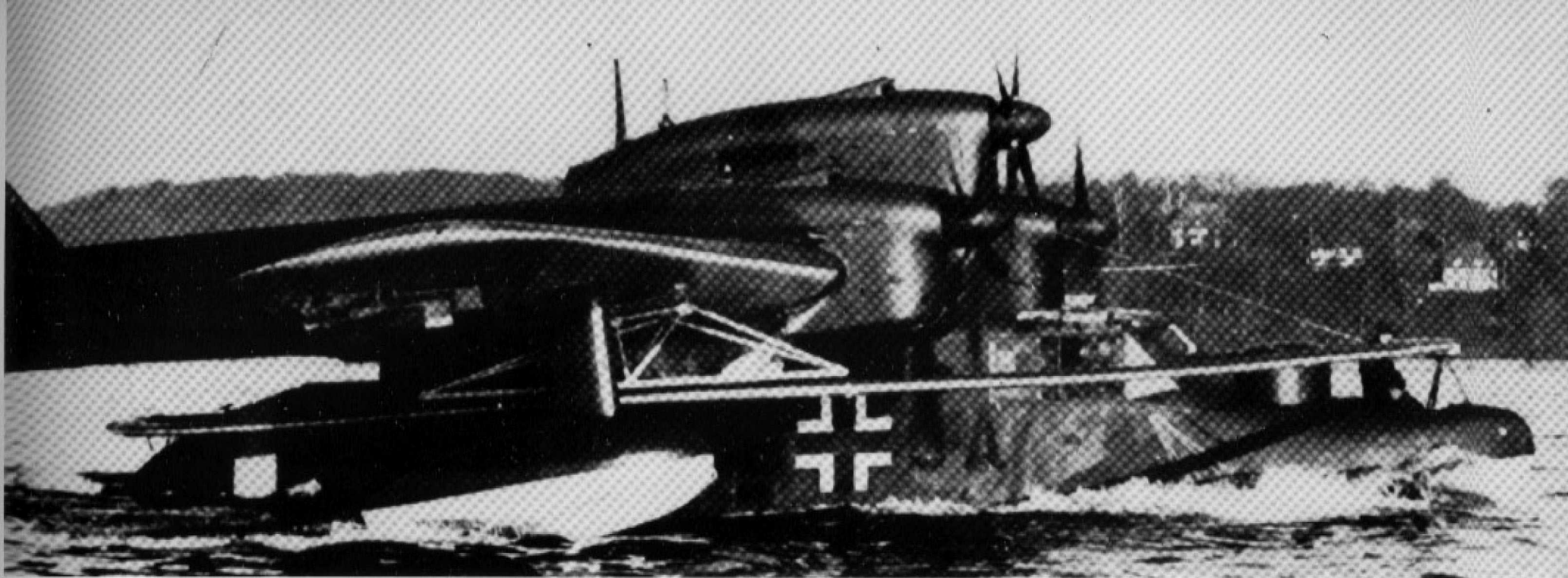
A Bv 138 sets down in the waters of its Norwegian base following several hours of patrolling over the North Sea.



A Bv 138 B-1 on a check-out flight over the Bay of Biscay.

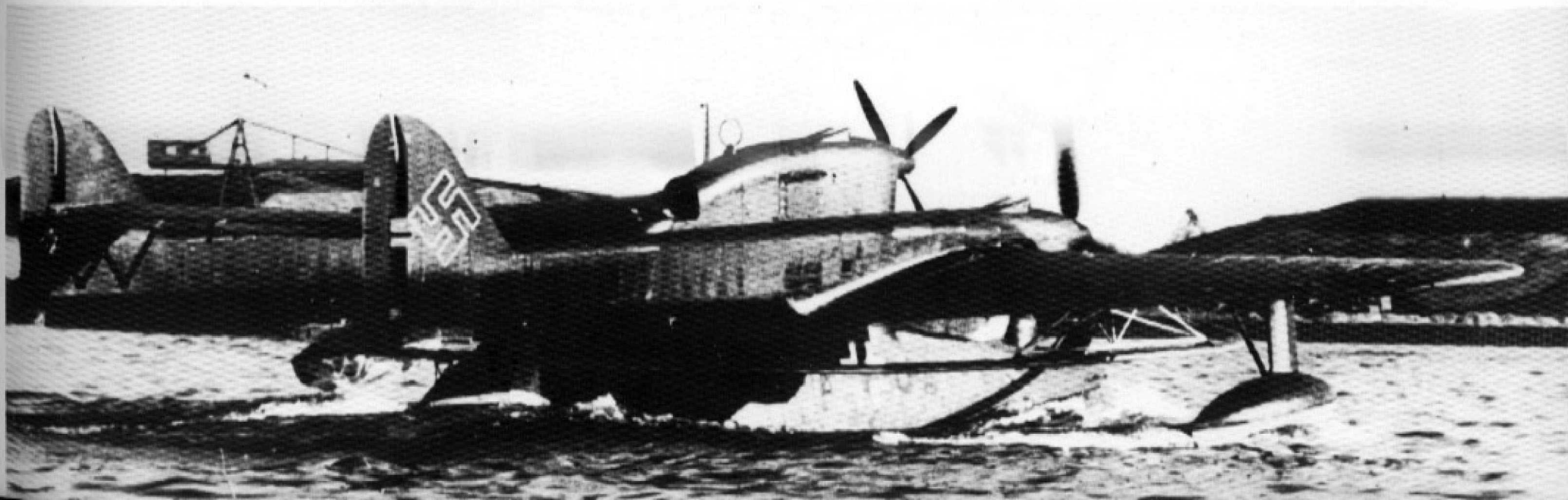


Since it was possible to render sea mines inoperable by generating an electric field above them, a few Bv 138s were fitted with these rings here and served alongside Ju 52s as the Bv 138 MS.



Above and below:

The mine degaussing ring's attachment to the wings and fuselage can be clearly seen in these two photographs. The Bv 138 MS was primarily used in the Black Sea region.





The Blohm & Voss Ha 139, Wk.Nr. 217, was also tested with the mine degaussing ring. However, this version did not prove successful.

Blohm & Voss Bv 138 C-1 Description

Type: three-engine patrol flying boat.

Wings: cantilever high-wing mounted on a pylon above the hull. Three-piece metal construction with sheet plates (excepting some fabric covered sections on lower wing). Central round beam, center section made of steel, also housed fuel tank, outer sections made of dural. Split flaps between aileron and fuselage.

Hull: short single step all-metal boat with sharply keeled bottom and straight sidewalls.

Stabilizers: Stabilizing surfaces at termination of two booms leading from outer engines. Rectangular cross-section all-metal stabilizer booms each supporting a vertical stabilizer. Horizontal stabilizer between vertical stabilizers, braced to latter with twisted V struts. All control surfaces made of metal with metal-plated tailplanes and fins and fabric-covered control surfaces.

Floats: two non-stepped outer floats with sharply keeled bottoms and semicircular upper sections, attached to wings by rugged main I-struts, each braced with secondary I-strut.

Powerplant: three Junkers 205 D, liquid-cooled six-cylinder, opposing piston, diesel inline engines each with 700 hp. Outer engines fitted with VDM three-blade metal variable pitch propellers of 3.30 diameter. Center engine with four-blade airscrew. Fuel supply in tubular beam of center wing section.

Crew: six men, consisting of nose gunner, pilot, navigator, radio operator and two additional gunners in rear fuselage.

Military equipment: 1 x 20 mm MG 151/20 in nose turret. Two turrets in rear of hull, one at tapered end of engine gondola to cover area above wing and other lower along end of hull for defense below the wing. 1 x 13 mm MG 131 in upper turret, 1 x 20 mm MG 151/20 in lower turret. 6 x 50 kg bombs or 2 x depth charges could be carried beneath center wing section.

Bv 138 C-1 Technical Data

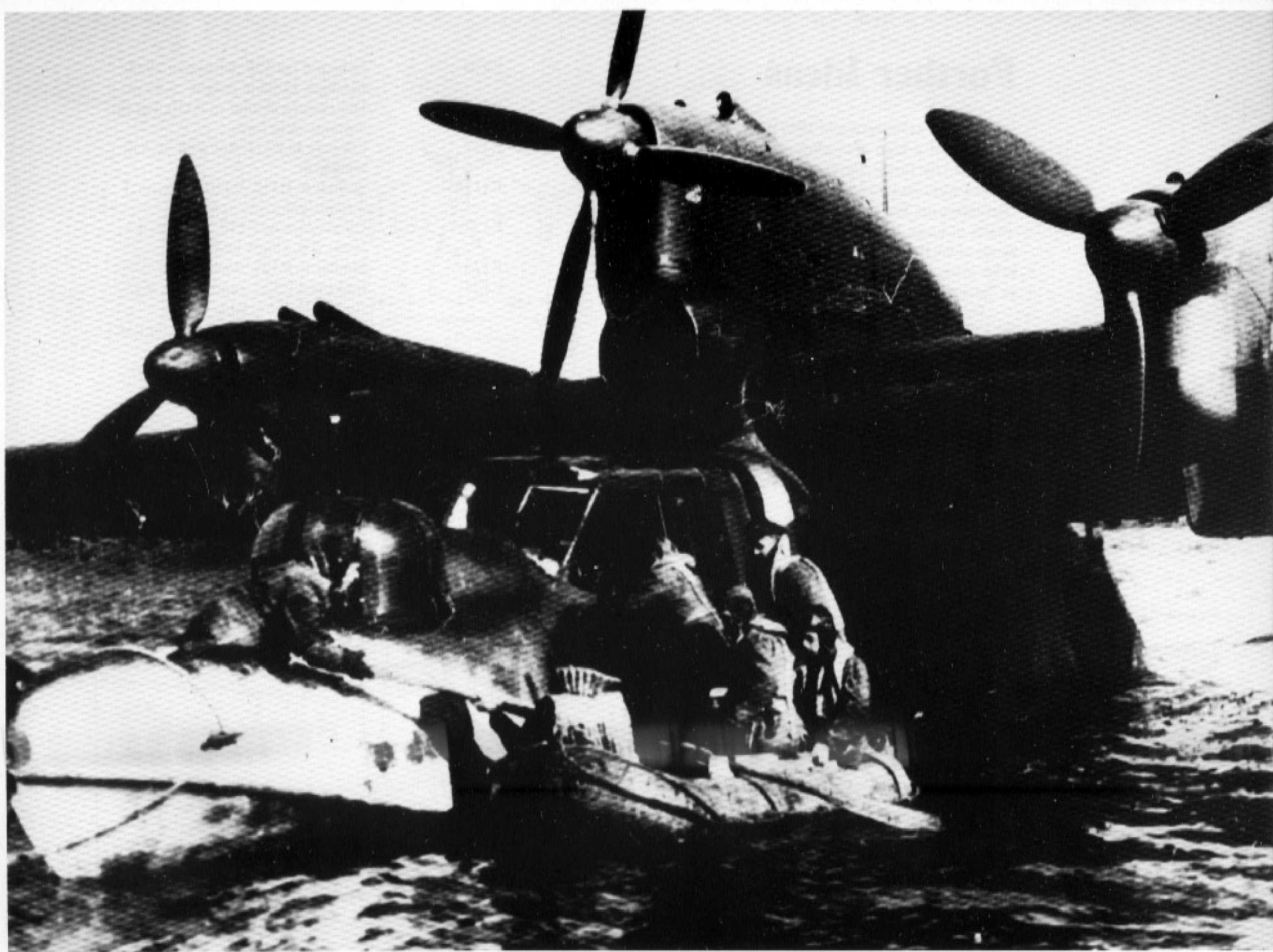
wingspan	26.936 m
length	19.850 m
height	5.900 m
wing area	112.0 sq m
weight(empty)	11,770 kg
weight(normal)	14,500 kg
weight(overload)	17,650 kg
maximum speed at sea level	285 km/h
cruising speed, maximum	265 km/h
economy	200 km/h
optimum range w. overload	4,300 km
normal range	1,250 km
normal endurance	6.5 hours
maximum endurance	20 hours
service ceiling no load	5,000 m
service ceiling w/full load	2,800 m

Bv 138 C-1 being refuelled. Fuel lines are clearly visible.





A Bv 138, stationed in the Crimea in November 1943, returns from a patrol over the eastern sector of the Black Sea.



The crew of a Bv 138 is ferried to their aircraft via a rubber dinghy and is seen here just climbing up into the cockpit.

Further Ideas

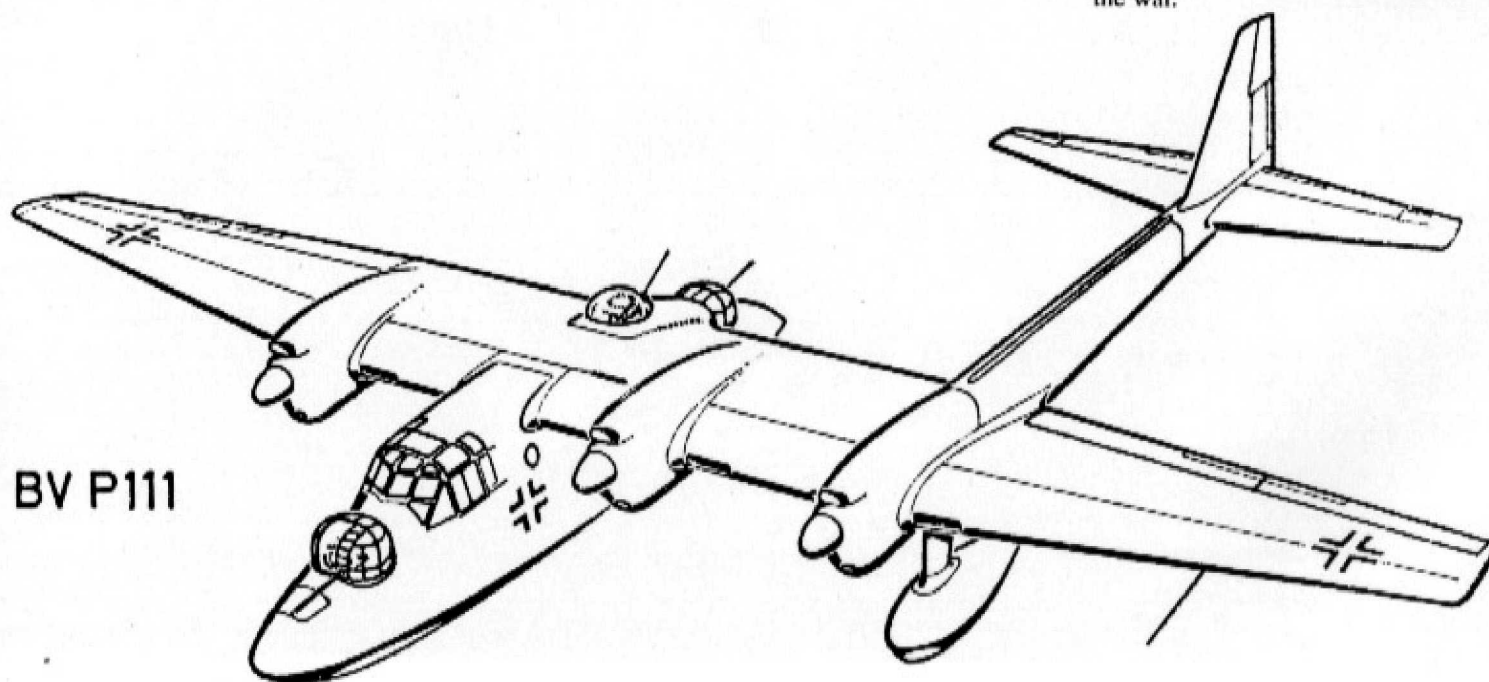
As early as the spring of 1940 the RLM recognized the value of a high seas long-range patrol craft and stimulated the further development of this type. Blohm & Voss were awarded a developmental contract for a "Replacement Bv 138." Dr. Vogt was a man with a wealth of ideas, and when Vogt's projects fell into the hands of the British after 1945, they were quite shocked at his plans. One of them even characterized his projects as "brain waves."

Dr. Vogt developed the following projects from the Bv 138, none of which were ever realized, however.

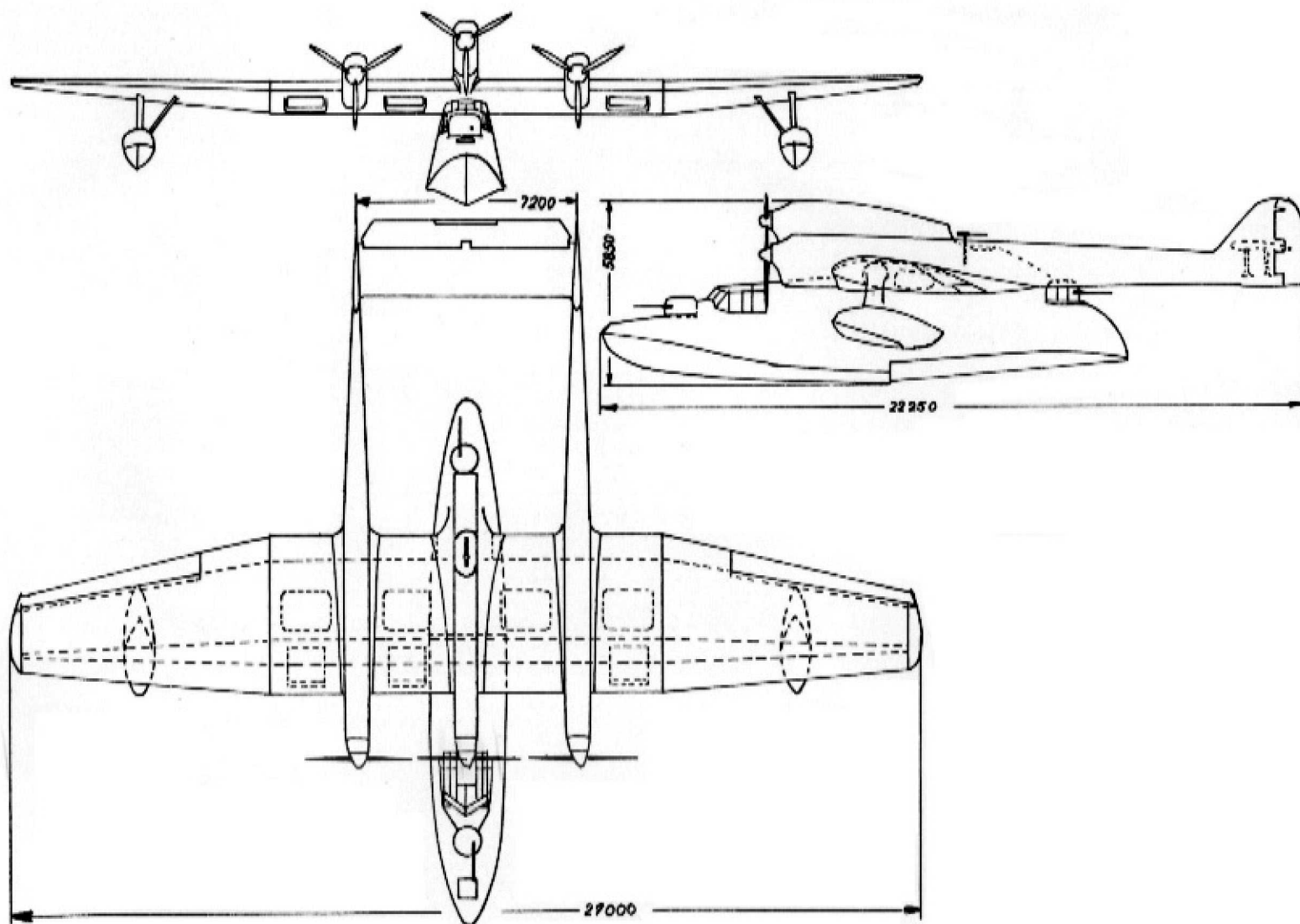
P.94	Improved Bv 138 with 3 x Jumo 207
P.108	Improved Bv 138 with 3 x Jumo 208
P.109	Improved Bv 138 with 2 x Jumo 308 + 1 x Jumo 205 D

P.110	Enlarged Bv 138 ,wingspan 29.00 m length 22.25 m height 5.85 m
P.111	Dimensions similar to P.110, but in asymmetrical form
P.112	Concept as P.111, but with 38.5 m wingspan
P.113	Similar to P.112, P.110-113 with 3 x Jumo 208
P.122	Dimensions as P.112, but with 4 x Jumo 208, single hull
P.123	Similar to P.122, double hull
P.124	Improved P.122, central hull, 4 x Jumo 208, retractable rolling landing gear obviating need for tow recovery equipment
P.125	Alternative solution to P.124 with twin hull

Although these projects never materialized, the Bv 138s which were built were reliable aircraft. Even in the most difficult of circumstances they never failed their crews and served faithfully up until the last day of the war.



BV P111



Three-view drawing of the project Bv. P.110.01-01.



Preparing a Bv 138 C-1 for takeoff.



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